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ILLUSTRATIONS.

New University Building, Lund, Sweden: Aula (Double-page Engraving).—Helgo Zettervall, Architect 76
Wall Paper Decoration: ("The Grosvenor") Adam Style (Double-page Engraving).—Designed by Mr. O. W. Davis, Architect 78
St. Albans School Board Schools (with Plans).—Messrs. John & S. Flint Clarkson, Architects 80, 81

CONTENTS.

The Permeability of Walls as affecting Ventilation 65
English and American Painting 66
Dying London 67
The Sorboxne at Paris 68
Mr. Tadema's "Cleopatra" 68
Doulton Ware Chimney-pieces 68
Tapestry Painting as a Mode of Decoration 68
School Planning: Primary Schools 69
Covent Garden Market-place 70
The Old Law Courts at Westminster 71
Central Tower, Peterborough Cathedral 71
Public Works and Buildings in London and Suburbs, in the Sixteenth, Seventeenth, and Eighteenth Centuries 72
The Victor Emmanuel Monument 73
Bitumenised Bricks 74
New Office Buildings at the Waterloo Railway Station 74
New Schools at St. Albans 74
New University Buildings, Lund, Sweden 74
Wall Paper Decoration 74
Normal Size for Bricks in Switzerland 74
On the Use of Building Stones 87
Portland Cement: its Manufacture and Uses 89
The Fall of a Factory Chimney in Bradford 90
Artane Industrial Schools 91
Setting a Chimney Upright 91
On Schools 92
Mr. P. H. Calderon, R.A., on Affectation in Art 92
Obituary 93
The Junior Army and Navy Club, St. James's-street 93
Competitions 93
To Render Textile Materials Incombustible 94
Building Patent Record 94
Elevated Railways 94
A Builder's Claim for Plans: Maxwell *v.* Scott 94
House Sanitation and the Nuisances Removal Act: A Cistern in a very Bad Position 94
Alleged Obstruction of Light: Gardner and Others *v.* Whiteley 94
Hardening Floors 94
Offices for the Cheltenham Gas Company 94
Circular Arrangement of Class-rooms 95
The New Law Courts 95
Miscellanea 95

The Permeability of Walls as affecting Ventilation.

FOR some time past the porosity of walls has awakened the attention of sanitary reformers, architects, and engineers. There were, it is true, Pettenkofer's most interesting experiments on this subject; but these have been, perhaps, looked upon too much in the light of interesting theories, rather than as facts to be taken into consideration in the daily work of the architect and builder. The matter, however, was brought forward more vividly by the Russians at the Paris International Exhibition of 1878. We remember calling the attention of our readers at the time to specimens of porous walls shown with the other exhibits of the St. Petersburg Pathological School. A glass case or jar was fitted hermetically upon one side of the section of a wall, and by means of a tube it was possible to blow upon the surface of the wall that had thus been covered. A similar glass jar, on the opposite side of the section received whatever air had been blown through the wall, and this escaped by means of a second tube, which, to enable the experimenter to mark the result, was dipped in a glass of water; thus a person taking up the one tube and blowing into it could see his own breath come up in bubbles in the glass of water, after it had travelled through the wall. With a simple brick the breath passed through with the same facility and promptness as if it had been smoke drawn from a Turkish pipe. With a thick stone wall it was necessary to blow long and hard to produce an impression; but when once the current of air had been established it was easier to maintain it. Among the persons who took special notice of these facts, we may mention Dr. E. Vallin, professor of Hygiène at the Hospital du Val de Grace; Dr. Grau Overbeck de Meijer, professor of Hygiène at the University of Utrecht, and the well-known French architect, M. Emile Trélat.

During the years that have elapsed since the Exhibition of 1878, further experiments have been made and the question more fully investigated. M. Trélat sought the advice of the celebrated ventilating engineers, Messrs. Jeneste & Herscher, who, with the assistance of M. Somasco, have commenced an elaborate series of experiments. The results attained so far are, however, in contradiction to previously accepted facts. Avoiding joints, which are, it is urged, a frequent cause of error, M. Somasco found that the amount of air passing through an ordinary wall, at a pressure of 30 kilogrammes per square mètre of surface, was only 120 litres per square yard. Under the normal pressure only 40 litres of air per square yard of wall would penetrate the room, and if the room was of the general size, this supply of fresh air would not represent more than 2 per cent. of its cubic contents, per hour. Basing his arguments upon these figures, M. E. Trélat argues that the porosity of walls is of little importance so far as ventilation is concerned; but he urges that the passage of oxygen through the pores of walls may contribute to preserve the purity of the materials with which they are built. We all know how readily a wall becomes an absorber of miasma, and too often little better than a reservoir of disease. Nothing, therefore, should be done to destroy the porosity of walls bathed externally by the purer outdoor atmosphere. They should, on the contrary, be allowed to absorb to the utmost the fresh air, so as to purify the materials with which they are built, if not to ventilate the rooms within. For partition walls, however, M. E. Trélat would employ every means of rendering them air-tight. There is no advantage in allowing the more or less foul air of one room to mix with that of the next room. By such filtration from one room to the other the walls simply become "miasmatic sponges." It may tend to equalise the foulness of each room, but what advantage can there be in thus establishing this equilibrium of evil? From the outer wall fresh air is obtained, which is a distinct gain, and by facilitating evaporation we are better able to resist the effects of change of temperature. These considerations should not, however, hinder the structure of thick walls, or, better still, of double walls with a "blanket" of air between them.

If from M. E. Trélat we turn to Dr. E. Vallin, we find that this eminent hygienist refuses altogether to allow the experiments made by M. Somasco to upset the theories derived from the studies of Pettenkofer. The experiments commenced in 1853 by that celebrated German scientist show that the diffusion of air through the body of walls is far greater than what was noted by M. Somasco; but that it was modified considerably according to the direction and velocity of the wind, or the difference between the internal and external temperature. Further, rain, by clogging up with water the external pores of a wall, helped to check the passage of air. While insisting that the amount of air supplied to a room, through porosity of the walls, is much more considerable than that discerned by M. Somasco, Dr. E. Vallin would nevertheless render even the outer walls absolutely air-tight. Complaints were made that walls rendered air-tight by enamelling or other means allowed humidity to gather and run drown in drops. But this humidity, produced to a great extent by respiration and the heat given off from human bodies, contains in dissolution the organic matter derived from our respiration and secretions. Absorbed by the pores of the wall, the solution evaporates and deposits the organic and putrescent matter it contains, and no experience has yet shown that this matter is destroyed in porous walls by the action of the air, as is the case with respect to well-drained soils. Thus walls, in spite of the infiltration of air, become what M. Trélat has defined as "miasmatic sponges." If, on the contrary, the sides of the walls are rendered impervious by a vitrifying wash or a silicate paint, the water, by condensing on the surface, renders the washing, or at least the wiping, of the wall a matter of absolute necessity, and thus secures the immediate removal of the organic matter, which, if left to putrify, would so gravely endanger the health of the inhabitants. In such buildings as hospitals and barracks the observance of this principle is more especially essential, and Dr. Vallin points to the lying-in hospital known as the Pavillon Tarnier, where the mortality from puerperal fever, &c., has been so marvellously reduced by constant and careful washing of the walls with an abundant supply of water. Not satisfied with mere paint, it is now proposed to protect these walls with porcelain, with plate-glass, or sheets of zinc, which would be absolutely impermeable, thus facilitating the washing, and rendering the absorption of organic matter impossible. In one word, therefore, Dr. Vallin admits that the porosity of walls is very considerable, and urges that, as it is also very dangerous, it ought to be prevented even in the case of external walls.

In Dr. Van Overbeck de Meijer, of Utrecht, we have the exponent of yet another doctrine on this subject. Dr. Meijer has not only studied Pettenkofer's experiments, but, with some slight modifications, has repeated each one of them in his own laboratory, and confidently asserts that his own experience confirms in every respect the results previously attained by the German professor. If we allow a difference of temperature of one degree Centigrade, there passes through an ordinary wall, per hour, per square mètre, 245 litres of air. By these experiments, it has also been demonstrated that no inconsiderable quantity of air forces its way through wood, especially through the joints that inevitably occur in putting wood together. Dr. Meijer does not, however, count so much on these currents as a means of local ventilation, but looks to the effect they have in reducing the dampness of confined air. When the pores of the walls are blocked by water and dust, the confined air can no longer pass out of the house, and the water, evaporated from the human beings dwelling within the house, condenses itself on the internal surface of the walls, the balustrades of the staircase, &c.

Then, indeed, the house becomes scarcely habitable, and is often extremely unwholesome. One example, given by Pettenkofer, helps to confirm this argument. Some workmen's houses in Germany were built with the *scoria* or refuse from the neighbouring iron works. This metallic material, thoroughly air-tight, was very rough and irregular in shape. The fitting of the pieces together necessitated the use of a large quantity of plaster; and the interstices between these *scories* were so numerous that the walls still retained a certain amount of porosity. Ultimately, however, a means was discovered of cutting the *scories* into even shapes, so that they could be fitted tightly together: this entirely destroyed the porosity of the walls. The evaporation outside of the damp arising inside was thus rendered impossible, and the houses became so extremely unwholesome that they had to be abandoned. The money spent in their construction was entirely lost. Dr. Meijer, therefore, is in favour of maintaining the porosity of all the walls; the partition or internal walls, as well as the outer walls, and this porosity he would further extend to ceilings, roofs, and floors. In fact, every house should be made as porous as possible, unless a very perfect system of artificial or mechanically contrived ventilation be introduced which will work as effectually during the night as during the day.

From all these arguments we may, perhaps, conclude that where the danger of infection is especially great, as, for instance, in hospitals; and where, at the same time, means of artificial ventilation are more easily established, it would be preferable to follow Dr. Vallin's advice, and destroy the porosity of the walls, and especially that of their inner surfaces. On the other hand, for private dwellings, where the presence of disease germs and organic matter in the atmosphere is not prevalent to so great an extent, it would be preferable to follow the advice given by Professor Van Overbeck de Meijer. The science of ventilation is not yet sufficiently understood for us to safely dispense with the accidental ventilation that so often helps to compensate for the ignorance or indifference of the public, and this view we have long held and often expressed. In England, however, the porosity of walls has been studied, not so much with a view to its effect on ventilation as to its influence on the dampness of dwellings. The exceptionally damp characteristics of the English climate, and the particularly porous nature of the bricks with which the greater part of our houses are built, have naturally led the public to patronise the paints and distempers which profess to exclude moisture. In seeking to attain this latter end, but few persons have paused to consider how far they interfered with ventilation, or prevented, especially when applying their paints to the outside of the house only, the oxidation, by infiltration of pure air, of the organic and putrescible matter absorbed within the pores of the walls.

In this respect, however, our attention has been called to what would appear to be a happy compromise. Mr. J. B. Orr suggests the following experiment with the distemper he has patented under the name of *Duresco*. He proposes that a brick should be partially scooped out and painted over with *duresco*. It will then, he maintains, retain water in the hollow till evaporation; just, in fact, as if it was a porcelain saucer. The distemper, therefore, is thoroughly waterproof. But, on the other hand, if the same brick is placed in an air-pump, it is easy to draw air through where water was unable to pass. Thus, while excluding damp, the ventilation through the pores of the walls need not be altogether hindered; and there may still be some hope for the disinfection by oxidation of the body or substance of the walls. Such facts when established by extensive experiments and vindicated by practical experience, would be of the utmost value. But, as the matter now stands, the whole problem is yet in the infancy of discussion. It would be somewhat presumptuous, with the limited evidence before us, to attempt to offer a definite answer to the questions suggested. We can, however, with confidence maintain that the experiments of Pettenkofer, of the Russian Pathological School, of M. Somasco, of Dr. De Meijer, and of many others, clearly prove that the porosity of walls is an important factor, for good or for evil, in the sanitation of dwellings, and should become the subject of more extensive and practical studies.

ENGLISH AND AMERICAN PAINTING.*

THIS is one of the useful illustrated handbooks of art history, of which we have noticed several already. It gives a sufficient though brief account of the English painters who have achieved a position in artistic history, commencing from a period before the history of painters really commences, which is illustrated by paintings in illuminated missals and elsewhere, the authors of which are entirely unknown. It was well thus to draw attention to the fact that England had her own painters and her own art in the period before the Renaissance, though it will not do to push this too far. There was nothing in England to compare with the pre-Renaissance art of Italy, or even of Germany, in the way of painting. Then there follows the period when foreigners occupied our stage entirely, or when the only aim of an English artist was to imitate Vandyck. The distinctly English epoch begins with Hogarth, who, as the author says, did not found a school, but who "was the first English artist who forsook exhausted conventionalities for large truthfulness and original thought, and thus paved the way to a new life in art," though he was himself "too original either to copy or to be copied." Reynolds and Gainsborough are happily treated of, and justice is done to Richard Wilson, who was once too much admired, and now is rather too little thought of. He must be judged in reference to the state of knowledge and feeling about landscape-painting in his day. The author points out that though Wilson did not go to nature so directly as he should, he had the merit of turning the taste of his own country from the meaner school of Holland to that of Italy, and showed the power of the English school to compete on this ground also (that of imaginative landscape) with the foreigner. Some practically dead reputations are revived in the notices of painters succeeding this period, men who, with great industry and indulging ambitious and lofty hopes, have just succeeded in establishing a right to be named in a history as men who were thought something of in their day. This kind of record is rather melancholy. The water-colour school of England has, as it should, a chapter to itself in the portion of the book referring to the eighteenth century.

In the succeeding chapter we observe that a rather more cordial word than we should have expected is put in for John Martin. We rather doubt if he can be said to have been unjustly depreciated since his death. His art was of a very false and showy kind, and made the pretence of sublimity at little intellectual expenditure. Some cordial words are bestowed, more fittingly, to the memory of Hilton, who certainly had higher powers than have been generally done justice to. An engraving of his "Europa" faces the page devoted to his memoir, in which he is described as "a gentle, silent, and retiring man, who knew much sorrow, and shunned publicity."

The brief additional treatise on painting in America is, perhaps, as extended as it could be fairly made within the scope of the volume, and in comparison with the far larger history and greater achievements of English painting. As far as history is concerned it may, in fact, be said that there is no history to write of American art. It is, as Mr. Koehler observes, only "the record of the dying away of the last echoes of movements which had their origin in Europe." There were, during a certain period, American painters, poets, and musicians to be found, who fancied they had it in them to reproduce in America the triumphs of the great European artists, and even to do this on a greater scale, consistent with the size and extent of "this great country, sir!" This tendency of Americans to look on themselves as bound to produce an art and a literature commensurate with the extent of their forests and the size of their rivers, has been the subject of a good deal of pleasant satire on the part of American authors who could see a little further than the States. There is a most amusing example of this in a conversation between a poet and an editor in Longfellow's prose story "Kavanagh;" and Lowell, in one of his lighter moods, has hit off the tendency of American artists and poets to imagine themselves the double of some great genius of the old world:—

> "I myself know six Titians, I think; one Apelles;
> A whole host of Scotts; any number of Tennysons;—
> In short, if a man have the luck to have any sons,
> He may make pretty sure that some one of the train
> Will be some very great person over again."

Consequently, the history of American art is a very uninteresting and unimportant matter for the most part. Two or three men only are to be named who were possible great artists, if their circumstances had been more fortunate. Mr. Koehler, nevertheless, divides the American art-history into four periods. First, we have the "Colonial," of which Copley, of Boston, and West were the chief names. West, it may be observed, appears in this small volume twice over, as an English and as an American painter, which is certainly giving him more importance than he ever deserved. The next is the Revolutionary period, of which also there are two prominent names, Gilbert Stuart and Trumbull, both almost entirely unknown on this side of the Atlantic. A half-length of General Knox, by Stuart, of which an engraving is given, leads to the idea that he may have possessed no ordinary power of giving force and originality to his portraits, if this is not an exceptionally favourable specimen. Trumbull was an officer in the States army, and carried on the sensible hint which West had given, of taking American battle scenes and other historic scenes, as they actually happened, as subjects for painting. His merit as a realistic painter of such scenes was recognised, we are told, by Thackeray (a fact which we did not remember), who cautioned the Americans never to despise or neglect Trumbull,—"a piece of advice," says the author, "which is only now beginning to attract the attention it deserves." Trumbull's system, however, found no imitators, and this period is followed by what the author somewhat grandiloquently calls "the period of mere development," which seems to have been marked by very little indeed that merited such a definition. Certainly Allston, who was the chief name of the period, and was "the American Titian," does not seem to have accomplished anything beyond a very poor and spiritless echo of Italian painting. There is, however, according to Mr. Koehler, one American *genre* painter *par excellence*, William Sydney Mount, and the engraving from a work of his, "The Surprise," a barn-door scene with two or three figures, gives the idea that he possessed some power and originality in the treatment of subjects from the everyday life of his own country. Mr. Koehler considers, however, that the most original development of the art of painting in America at this period was in the direction of landscape painting. "In this department also it seemed for a time as if the influence of the old Italian masters would gain the upper hand. But the influence of Düsseldorf, aided by that of England, although not through its best representatives, such as Constable, gave a different turn to the course of affairs, and in a measure freed the artists from the thraldom of an antiquated school." The American painters began to go direct to the scenery of their own country, to the Catskills, the Hudson, the White Mountains, &c. "It has become the fashion in certain circles to speak rather derisively of these painters as 'the Hudson river school,' a nickname supposed to imply the charge that they preferred the subject to artistic rendering and technical skill. There is no denying that there is some truth in this charge, but later experience has taught, also, that a more insinuating style is apt to lead the artists to ignore subject altogether." The greatest name among these early American landscape-painters, we are told, is that of Thomas Cole, who came from England in 1819, but whose art was entirely acquired in America. We are sorry to say his works are entirely unknown to us. The author mentions the names of Shaw, Kensett, and Gifford, among leading members of the "Hudson River School." As to the modern tendency, we can well understand what the author means in hinting that it is towards a manner of painting in which subject is a secondary consideration. American artists seem now to be taken up with a study and emulation of French art, but not of the best French art. As far as we have observed, they are inclining towards the heresies of the impressionists, and adopting some also of the present very regrettable tendency in French art to the treatment of vulgar and disagreeable types of contemporary life and society, with an often repellent and some-

* English Painters. By H. J. Wilmot Buxton, M.A. With a Chapter on American Painters, by S. R. Koehler. London: Sampson Low & Co. 1883.

times almost disgusting realism. We have seen one or two modern American paintings in which, with unquestionable talent, the disagreeable and sensual quality of the school of French art which the American seems to be emulating, are even outdone. It is to be hoped that the American painters of to-day will, while gaining all they can from the technique of the French painters, set themselves a higher and nobler task than that of reproducing the lower qualities of contemporary French painting, as far as figures are concerned. In lanscape-painting they seem to have been more got hold of by Corot than by any other painter. Mr. Henry James ridicules, in one of his shorter sketches, the spirit of affectation which leads a young Bostonian to describe the day as "quite a Corot day," and suggests, through the mouth of another personage in the story, that America might find a language of her own to speak in, and metaphor of her own, instead of borrowing that of France. And in the style of the very charming illustrations to the *Century* and other American magazines we detect the influence also of Corot, in the aërial faintness of the landscape effects, for the attainment of which a new handling of wood engraving has been matured. It appears to us that it is in this matter of handling, of the mechanism of the subsidiary forms of artistic execution, that American art has so far shown its originality. More than this is required, however, to make a school; and though we believe there has really been an immense advance in America of late years, both in regard to the execution and appreciation of artistic spirit, we cannot feel that the mere reproduction of the spirit of modern French art promises more in the way of permanent interest than did the former imitation of old Italian art. If the Americans will draw upon the special features of their own daily life, their own society, their own history, and their own scenery, for subjects, they have now, we imagine, the artistic power to treat such subjects with force and originality, and it is to the development of American art in this direction, in regard to subject, that we should look for the best chance of the formation of a national American school of painting.

DYING LONDON.

"So might we talk of the old familiar faces—
How some they have died, and some they have left me,
And some are taken from me; all are departed;
All, all are gone, the old familiar faces."

AT the beginning of a fresh year it may not be inopportune to chronicle, from various sources, some of the topographical changes which, in extent and importance, render the last twelve months or more unusually eventful the history of old London. Newport Market, with Grafton House, Prince's and Market rows, and parts of the neighbouring Litchfield, Grafton, Little Newport, and Market streets, Hayes and Newport courts, in Soho, have been already cleared away for the new street from Piccadilly to Bloomsbury. This street, in crossing Wardour-street, will also swallow up a former residence of Nell Gwynne.* With the new Peabody Trust Buildings, between Drury-lane and Great Wild-street, has disappeared a picturesque wooden house in Prince's, now Kemble, street. The demolitions for the workmen's buildings comprise Lincoln-court, formerly named Holford-court, after the original owner, and then Stewart's-rents; Orange-court (where the outbreak of typhus fever, in November, 1879, first opened the authorities' eyes to the squalor, vice, and disease in this quarter); Brewer's-court, Wild-passage, and Pit-place. The last-named alley stood on the site of the ancient Cock-pit, which a mob demolished in 1617, rebuilt as the Phœnix Theatre. Here were produced Marlow's "Jew of Malta," Webster's "White Devil," Heywood's "Woman killed with Kindness," and Massinger's "New Way to pay Old Debts." The triangular space long known as Aldwych Field or Oldwick Close, from the Via de Aldwych, or footpath leading from the Strand to Aldwych Cross, St. Giles's, by the once famous White Hart Tavern, came into the possession of Henry Holford and Sir Henry Drury *temp.* Queen Elizabeth. In the year 1623 it passed to Sir Edward Stradling and Sir Kenelm Digby, of whom the former built on his portion "a fair large mansion-house, with stables and outhouses." Kemble-street was built in Queen Elizabeth's reign; but Oldwick Close was then bounded towards Great Queen-street, on the northern side by a ditch, and on the eastern side, towards Lincoln's Inn-fields, by a sewer. About 1650 all this property came into the possession of Humphrey Weld, a local magistrate and ancestor of the Welds of Lulworth Castle, who, in 1651, laid out on either side of his house the street since known as Great Wild-street. About this time Drury-lane began to lose reputation as a fashionable quarter of the town. New chambers replace Palsgrave-place,* and Nos. 231-3 Strand, the quaint partly-wooden houses that faced what is now the main entrance to the Courts of Justice; whilst the removal, at a cost of nearly £93,000, of Nos. 194 to 202 Fleet-street, between Bell-yard and Chancery-lane, to be followed by Apollo-court and the time-honoured Cock Tavern, has abolished a home of Izaak Walton. Here, next door to the then Harrow Inn (No. 198), he shared a house with one John Mason, a hosier, during the interval 1624-1632, at the end of which he removed into Chancery-lane. The northern wing of Brick-court, Temple, has fallen a prey to the fate of its neighbour, Elm-court, and which ere long will overtake the western side. No. 2 staircase leads to the chambers where Blackstone wrote his "Commentaries on the Laws of England," and of him whose death was lamented by that strange unaccustomed group of unbidden mourners one April morning rather more than one hundred years ago. The "Retaliation" lay unfinished in his desk: yet not to weep for the author of the "Traveller" and the "Vicar of Wakefield" had they come,—as such he was scarcely known to them,—but for one who to them—wretched outcasts—had ever extended a hand of melting charity, one whom a hard world had not, nay, could have never spoiled, and who, despite a thousand acts of heedlessness and folly, won the love and companionship of men like Johnson and Garrick, Burke and Reynolds.

Few City parishes have suffered more during the period under review than All Hallow's, Barking. The operations of the Metropolitan Railway Companies, combined with the projected throughfare from Trinity-square to King William-street, involve the destruction of much property along the east end of Tower-street and the houses between Barking-alley and Katharine-court,—Lord Justice Bovill's birthplace. At No. 14 of these latter (marked, together with No. 13, by the arms of the Mercers' Company), the Jacobite lords were lodged on the eve of their execution; a shaft opposite the house shows the precise locality of the scaffold. In constructing the Inner Circle from Aldgate, numerous Roman and Mediæval remains were discovered. An extensive piece of the City wall lay beneath the surface at Trinity-square, where the ditch was observed to have been diverted eastwards from the wall. Much had to be destroyed, but fortunately the fine relic above ground on the eastern side of the square is spared, and forms a conspicuous feature by the new road at the back of the temporary Tower station. The railway passes through the wall between Trinity-mews and the Crescent. In the Minories were found traces of the Roman cemetery and of what were believed to be the walls of the Minorite Convent of St. Clare beneath the foundations of the dwellings between Church-street and Aldgate. Mr. John E. Price, F.S.A., is investigating the antiquities in this district, and expectation is aroused by the undertaking which we understand he has made to prepare a report of them when the works are completed. A new market is opened at Leadenhall in place of that which, built in 1730, represented one which has been famous ever since the fourteenth century, when Sir Hugh Neville acquired for a granary the old manor-house and priory here. On the other hand, readers of "Dombey & Son" will miss the shop in Leadenhall-street distinguished by the wooden figure of the Little Midshipman, and generally identified with that of Uncle Sol. The Church of St. Mary, Whitechapel, first built in 1339, and burnt on the 27th August, 1880, and which contains the grave of Richard Brandon, who beheaded King Charles I., was re-opened in December for divine service.

Passing further eastwards, important structural alterations have just been completed in the Mint, in lieu of the once contemplated removal to the Victoria Embankment. The Midland Railway Company have absorbed some notable old wooden houses in Royal Mint-street, beyond the Tower, whilst their new dock at Poplar replaces Messrs. Money Wigram & Sons' yard,—a spot of considerable historic interest, having been a ship-building yard since Queen Elizabeth's reign. Forming part of the premises of the first East India Company at the beginning of the seventeenth century, it passed into the possession of Sir Henry Johnson; and a wet dock, the earliest of its kind in England, was made. Here a large number of men-of-war, East Indiamen, and Government troopships have been built, the last of them to be launched being the *Crocodile*.

Carrying our record further backwards in point of time, we should notice the fossils excavated beneath Drummonds' new bank at Charing-cross. Classified and arranged by Mr. Rowland Ward two or three months ago, these include bones of the cave lion (*felis leo spelæa*), tusks and bones of the mammoth, of the extinct elephant (*elephas primigenius, elephas antiquus*), remains of extinct Irish deer (*cervus megaceros*), of red and other deer, and of extinct oxen, from the pleistocene gravels; together with, out of later deposits, bones of the horse, sheep, and the short-horned Celtic ox (*bos longifrons*). On the 29th of March the Baroness Burdett-Coutts laid the foundation-stone of the new Westminster Town-hall, erected over a clearance in Little Chapel-street. The estimated cost (25,000*l.*) of this building of brick and stone in the Renaissance style designed by Messrs. Lee & Smith, of Queen Victoria-street, was more than met by the sale to the Kensington Guardians of the old workhouse in Marloes-road, Kensington. In that quarter of the town the materials of Mr. Albert Grant's mansion, which, with its grounds, covered about seven acres, and was built in 1873 at an outlay of 270,000*l.*, were lately sold by auction. The transfer to the governing body of Westminster School of Ashburnham House and its garden,—site of the Abbey Refectory,—evoked much public interest. To the accounts which with illustrations have appeared in our own columns,* we may add that the school authorities have at last taken possession; and notices are affixed upon the staircase warning the boys to respect their new heritage. The house's history is somewhat obscure; but it would appear to have been built by the celebrated "Jack Ashburnham" (the trusted and faithful attendant of King Charles I.), eldest son of Sir John Ashburnham, of Ashburnham, Sussex, and grandfather of John, first Lord Ashburnham, who was living here in 1708. In 1730, the Crown bought the lease of his son John (created that year Earl of Ashburnham) for the housing of the Cottonian MSS., which had been purchased some twenty-five years previously. The fire that threatened to reduce the whole collection to ashes broke out in the early morning of October 23rd, 1731. In a letter to Lady Sandon, Dr. Robert Freind, headmaster of the school, gives a diverting picture of Bentley, the librarian, rushing forth out of the flames with the Alexandrine MS. of the Scriptures in his arms,—the priceless Codex A. which Cyril Lucar, patriarch of Constantinople, had presented to King Charles I. In the year 1739 the Chapter purchased the remainder of the lease from the Crown. Another work of the "English Palladio," the chapel of Lincoln's Inn, is in course of being lengthened towards its western end, room having been made by the pulling down of two sets of chambers in Old-square, which presented a fine specimen of Jacobean brickwork. In High Holborn, the First Avenue Hotel stands on the site of No. 45, the house of Mr. Bland, music-dealer, with whom Haydn lodged at his first coming to England, in January, 1791. Nearly opposite are the houses that replace the two highly-curious examples of old street-architecture which covered the entrance into Tichborne-court. A new police-court has arisen in Bow-street, and on the 14th of March Evans's Hotel, Covent-garden, was opened as the Falstaff Club. That house, whose façade in likeness of a ship's forecastle forms the background of Hogarth's "Morning," retains many memorials of its origin. Burnet says it was erected for Admiral Edward Russell (afterwards Earl of Orford), in reward for his eminent naval services, particularly the victory over the

* See *Builder*, vol. xliii., p. 776 (16th December, 1882).

* Built on the site of the Palsgrave's Head Tavern, so-called after Frederick Palsgrave of the Rhine, and for one winter King of Bohemia, husband of Elizabeth, the "Queen of Hearts," daughter of King James I.

* See the *Builder*, vol. xlii., pp. 27, 38, 84.

French fleet off Cape La Hogue in 1692. The principal staircase is reputed to be formed out of the timbers of the Admiral's flag-ship, and nearly all the main woodwork is of seasoned oak or teak bearing many tokens of having previously served in marine architecture. As Master of the Mediterranean, in 1695, Russell retrieved his comrade Rooke's defeat by the French Admiral Tourville in Lagos Bay.*

Admirers of the real Queen Anne style, so different from the nondescript variety which now passes under that name, must regret the loss of Nos. 48 and 49, Great Ormond-street, the Hospital for Sick Children, built in the first decade of the eighteenth century. From No. 49, Dr. Stukeley, the "arch druid," dates his "Itinerarium Curiosum" in 1724; and here Dr. Mead died thirty years later. The beautiful wooden portico of No. 48, with its two finely-carved Corinthian columns and fluted pilasters behind, entablature, and cambered pediment, was purchased for the South Kensington Museum; those who could appreciate elegance and thoroughness of work gladly bought the staircases, ceilings, and other interior fittings. In Coleman-street, Bunhill-row, the Society of Friends erected a coffee tavern, with other buildings, on part of the site of their old burial-ground, out of moneys received for the compulsory sale of portions of their property to the Metropolitan Board of Works. As over the site of Stockwell Park House, and the old Tradescant garden at Lambeth, so, at Chiswick, villas are rapidly covering the "Home Field," a plot of ground that adjoined the once "Pest House," which for centuries served as a sanitarium for the Westminster boys. The Pest House was long occupied by the printing-office of Messrs. Whittingham & Co., giving its name to the famous "Chiswick Press," but a few years since was pulled down for building purposes.

Of places associated with literature and the arts may be instanced Well-walk, Hampstead, identified with the memories of Richardson, Johnson, Constable, Leigh Hunt, and John Keats. Here one now looks in vain for the pump and assembly-rooms; the chalybeate spring is turned into a drinking-fountain, whilst the homes of Goldsmith, in Monument-yard, of Rogers, at Stoke Newington-green, and Turner, at 23, Queen Anne-street,† Cavendish-street, have likewise disappeared. At Hampstead, too, last spring, was pulled down the Queen Elizabeth's Chicken House, in Roslyn-street, a hunting-box of James I.

A theatre occupies the site of the house in which Addison wrote his "Campaign"; two hotels that of Northumberland House with its garden. The King's Bench prison has been pulled down. Burned by the "No Popery" rioters on June 7th, 1780, in it Lord George Gordon himself was for a while confined. The Bankruptcy Act of 1861 freed many an insolvent debtor; and upon a subsequent Act for removing the prisoners to Whitecross-street prison, the King's Bench was used as a military jail. The National Model Dwellings Company have built their Queen's-buildings on the ground. A Weights and Measures Office is established in the entrance-gateway, being all that remains, of the Surrey County jail in Horsemonger-lane, now Union-road. We conclude this necessarily incomplete sketch in reminding our readers that on the 30th January last a new commission was read at Newgate whereby that jail ceased to be a prison for the detention of prisoners, except during sessions of the Central Criminal Court; and that on the morning of the 4th December her Majesty's judges and law officers proceeded for the last time in solemn state down Westminster Hall, where eighteen days later the Old Queen's Bench Court closed for ever.

THE SORBONNE AT PARIS.

A COMPETITION which was opened for plans for the enlargement of the Sorbonne at Paris was participated in by eighteen competitors. The first prize was awarded to the architect, M. Nénot, who had previously distinguished himself by winning the *Prix de Rome*, and afterwards the first prize in last year's Victor Emmanuel competition.

* See Burchett's "Memoirs of Transactions at Sea"; Burnet, ii. 114-116; *London Gazette*, July 17th, 1693.

† Hence, Turner removed to No. 119, Cheyne-walk, Chelsea, where he lived (and died) as Mr. Booth.

MR. TADEMA'S "CLEOPATRA."

THE new work by Mr. Tadema, which has now been added to the collection at the Grosvenor Gallery, is one of the finest paintings which he has produced. It represents Cleopatra as Mark Antony first caught sight of her in her barge on the river Cydnus, as described in the passage in Plutarch, which Shakspeare has rendered familiar to every one by his splendid paraphrase of it in "Antony and Cleopatra" (act ii., sc. 2). The painter does not, it is true, follow out the passage literally from Shakspeare, and those who expected to find it so may be a little disappointed at first sight at the comparatively tame effect, and the absence of that brilliant and gorgeous effect of colour and accessories which Shakspeare has massed together in the speech of Enobarbus. We have not the smiling Cupids, nor the mermaid at the helm, nor does the barge the queen sits in "like beaten gold, burn on the water"; on the contrary, it is a wooden barge, decorated, Egyptian fashion, with some ivory inlay. The painter has circumscribed his scene, in fact, in order to concentrate our attention on the principal figure; and we do not see the whole barge, only the central portion, under the rose-garlanded canopy, beneath which sits Cleopatra. She is a dark-complexioned woman, with strong aquiline features and a large and full chin, who sits draped in semi-transparent stuff, and with a tiger-skin clasped, head to claw, over her bosom. She is very much the type of woman that we can imagine Cleopatra to have been. The other figures visible on the barge are dark Egyptians, two girls playing on stringed instruments and a negro or negress pulling back the curtain furtively at one side to have a better view of Antony. The barge in which the latter is has drawn up nearly alongside that of Cleopatra, and Mark Antony, in white drapery, rises from his seat in the stern and turns with astonished and eager looks towards Cleopatra, who affects not to notice him. The figure of Antony is not up to our idea of the man; he is somewhat haggard and unkempt-looking, and poorly "set up" in the way of costume. The painting of his barge, with its bronze plating, and the shimmer of the water repeated in the shield of the man standing near the bulwarks, is beautiful. But nothing in the picture is finer than the big trireme, as big as a modern frigate, which is seen coming along foreshortened at the left of the picture. This is so minutely studied, and the whole of the details so carefully made out, that we seem to have seen the old Roman fighting-ship actually revived before us. We see the heavy gallery projecting from the upper deck which afforded the fulcrum for the upper bank of oars, and which recedes in the two lower stages so as to bring each bank of oars nearer up to the ship, and below this we see the ponderous metal ties by which the rowing galleries are bound to the main framework of the vessel, and the immense strain of the oars communicated to the hull. Along the bulwarks are the shields, hung outside in regular order just below where the hammock-nettings would be in a modern man-of-war. This piece of naval architecture is on a par with Mr. Tadema's fine painting of Roman civil architecture, and is in itself worth seeing. In the distance several other large triremes are seen coming up the stream in perspective. The whole thing is wonderfully real, and it is difficult to shake off the idea that one has actually seen Cleopatra, and been back, for a day, at the entry of a Roman "Channel squadron" into one of its appointed ports.

DOULTON WARE CHIMNEY-PIECES.

MESSRS. DOULTON have placed on view in the ground-floor galleries of 9, Conduit-street some examples of new suggestions for the employment of their coloured-ware for chimney-pieces and the adjuncts of fireplaces generally. The material is so well suited for producing effective chimney-piece designs at a moderate cost that it is surprising that it should not have been turned to this purpose before; it is warmer-looking than stone or marble, and more durable than the wood mantelpieces which have been a good deal employed lately; it has also the advantage of grouping better with coloured tiles, so often used now in fireplace decoration, than does wood. Of course, there is the drawback that it cannot be produced in such large pieces as marble, nor can the joints be made so neat and so true. This is one of the drawbacks to the use of the material in fine work which it seems so far impossible to surmount. But the effect of one or two of the specimens in the room at Conduit-street is very good; one or two that are not so good are objectionable chiefly through the attempt to do too much and to over-ornament portions, such as shafts, which will not bear that kind of florid treatment. One or two partially new forms of stove and fireplace are worth notice.

TAPESTRY PAINTING AS A MODE OF DECORATION.

THE revival of the process of tapestry painting as a method of supplying internal decoration to dwellings has several points in its favour. It is a mode of painting which combines something of the texture and effect of tapestry work with simplicity and ease in execution. It is, in fact, painting on a fabric instead of weaving work upon it. It has not the richness of effect of tapestry, it is true, nor, we may conclude, as a matter of course, is it so durable; but this is not an unmixed disadvantage. Stuffs used for decoration may in a sense be too durable,—an objection which we certainly think applies to tapestry. It is a decorative material produced by a lengthy and costly process, and one which adds to the weight and durability of the stuff on which it is worked, and it becomes, therefore, a valuable property, which has cost much time and labour, and must be treated with respect, and carefully preserved accordingly. But, unfortunately, its value from an artistic point of view does not render it in the least less of a dust-collector, and we can imagine a piece of tapestry, considered too valuable to be parted with or put away out of sight, remaining a receptacle for the dust and dirt of years, and anything but a sanitary influence in the house in which it is hung. Look at some of the old and faded tapestries at Hampton Court and elsewhere, and say if these are, in this point of view, desirable linings for a dwelling-room. There is also the objection, artistically, that tapestry must be on a large scale, and at a certain distance from the eye, in order to look well; otherwise it has a bad and ill-defined outline.

All these principal drawbacks to the employment of tapestry are absent from tapestry painting. The process is not very expensive either of time or money; a better outline can be produced than in woven tapestry, and the comparative cheapness and ease of its production will allow of new designs being not unfrequently made for the same room, and the old ones, when they have become clogged with dust and consequently unwholesome, can be thrown away without the qualms of conscience and of purse which would afflict the man who had to throw away a piece of really costly tapestry for the same reason.

The apparent simplicity of the process renders it very suitable for amateur working, and from the collection of work of this kind which Messrs. Howell & James have had in their establishment for some time, among which there is nearly as much amateur as professional work, the amateurs (ladies chiefly, if not entirely) seem to have taken to it very kindly and in some cases certainly very successfully. The æsthetic lady of a former age would have spent a great part of her life in weaving on to a fabric the design of an artist, of which she did merely the lengthy and laborious mechanical work. The æsthetic lady of to-day is offered the choice, if she have the requisite skill, of inventing and executing her own design, with perhaps nearly as good result, and with far less labour.

We have, however, seen a good deal among the work of the amateur painters of tapestry, and some among that of the professional workers, which had better not have been produced at all. Landscapes are not in place in this method, neither realistically painted figures in harshly coloured garments. It must be devoted to purely ornamental design, to symbolical design, or to conventionally treated figures. Too pictorial a treatment only produces the effect of a bad picture, harsh and deficient in tone. Kept within the limits of the kind of design which the method and material are really fitted to express, it is a very charming process, offering great facilities for the introduction of special and personal taste in the decorative treatment of one's own habitation.

SCHOOL PLANNING: PRIMARY SCHOOLS.

SEEING that the Education Department, in the last returns, credited the 26,376 departments in the 18,000 primary day schools in England and Wales with accommodation for nearly four millions and a half of children,* or about one-sixth of the whole population as then estimated, it would almost seem as if architects might give up some of the activity of invention, and professional journals some of the keen scrutiny, shown during the active years since the passing of the Education Act of 1870. In 1869 about 1¾ million children could be accommodated; room has since been made for between 2½ and 2¾ millions. Of these about 1¼ million are in voluntary schools, and the remainder have been provided for by School Boards, who have borrowed for the purpose, on the security of rates, between 13 and 14 millions sterling. The number of children on the school registers fell short of the number for whom accommodation was provided by nearly 350,000; and of the children on the registers over 670,000 were not present on the day of inspection. Such figures might support very well the contention that if all the buildings were of the right sort, put in the right places, and managed by the right people, the immediate wants of the population would be sufficiently met. Figures, as we all know well, can be made to prove almost anything, if judiciously used in the presence of an uncritical audience. It is difficult, however, when many of the existing school buildings are spoken of with disrespect to stand by them very firmly; there are, indeed, various good reasons why modifications of what exists, and additions to the existing supply, must be constantly in hand.

Many schools will bear, probably to the end, the marks of the time which produced them. Belonging to different denominations, they have often been placed so as to group conveniently with places of worship. The founders of many of these did not cast a prophetic eye towards modern needs. When education had among Nonconformists little bands of enthusiastic but not over-rich supporters, cheap bits of land were gladly taken over, when they could be got, and cheap buildings were put up on the cheap sites. Some considerable number out of the 1¾ million school-places existing before 1870 were in buildings which were erected when a class-room, or a separate room for infants, was a luxury which could well be done without, and babies, lavatories, ample cloak-rooms, and such things were the inventions of a later time. They were also contrived a double debt to pay, —the school-rooms serving as meeting-rooms for business, lectures, displays of magic-lanterns, concerts, and teas. This general utility did not always make them specially unsuitable, but certainly did not make them more suitable training-places for children.

On some school inspectors falls the uphill work of applying a firm and steady pressure in order that the irreducible minimum of the code may be complied with. The article 19*c* of the previous code, No. 96 in the new code (1882), shows the weakness and the power of the inspector:—why, with reference to buildings, as with reference to school-work, he has different standards to suit different places and people, the "irreducible minimum" contrasting strongly with counsels of perfection. Public opinion reaches the heads of departments pretty quickly by one channel or another, and the spiriting has consequently to be done with some gentleness; but, on the other hand, little credit is to be got from a weak use of powers, conferred by Parliament and the country when the time was ripe. In quoting the article, it may be well to call attention, by the way, to two alterations of some importance, by putting the new words in italics, and the superseded words within brackets.

"96. The Department must be satisfied:—

(*a*) That the school premises are healthy, well lighted, warmed, drained, and ventilated, properly furnished and supplied with suitable offices, and contain sufficient accommodation for the scholars attending the school.

N. B.—In administering this article the Department will endeavour to secure at least 80 cubic feet of internal space, and 8 ft. of internal area for each *unit of* [child in] average attendance; but in a school built with the aid of a loan sanctioned by the Department, the average attendance should not exceed the number for which the plans were approved by the Department. If in the neighbourhood of any such school there is a deficiency of school accommodation, which is being supplied with due despatch, the accommodation of that school will, pending the supply of the deficiency, be calculated *in the same manner as that of schools not built with the aid of a loan* [according to the usual rule]."

Supported by the spirit if not by the actual letter of this article, inspectors have, for instance, laboured with persistence to get boarded floors in school-rooms, in place of bricks or tiles. In one English district, containing 186 schools, it is recorded that there were no less than thirty without boarded floors three years ago. The painstaking inspector in his published report gave a *résumé* of the arguments, which had sometimes convinced managers that schools should have wooden floors, although the children came from brick-floored cottages; and he hinted that the floors were being altered at the rate of about seven in a year. Then he would evidently be ready for further movement; but the annual grants would be continued notwithstanding coughs, colds, discomfort, and greater efforts of voice,—the "irreducible minimum" not yet including wood floors as a matter of course. In districts torpid from absence of attraction or of trade, unwilling listeners to suggestions of improvement may be looked for; but, happily, elsewhere there is no tendency to look on the "conditions relating to premises" (article 96) with a grudging mind. The mere words are not the measure of what is attempted and done; and ratepayers groan,—inwardly rejoicing at the same time,—over buildings suitably placed and planned, healthy and well found in every way.

Tinkering and remodelling existing buildings, and substituting new for old, are not impressive; but the natural increase of the population in England and Wales will probably call for over half a million school places in the next ten years,—principally, it is to be feared, in the large towns. There may, besides, be instances, of very rapid growth, such as made Middlesbrough so quickly a town of 90,000 inhabitants, and placed 28,500 more people in Barrow in ten years. The population of a decent country town may thus be poured, as the result of leaps and bounds of trade, into primary schools in one place during a decade. In the future it may not be a subject for unmixed satisfaction that 15½ millions have been expended in England and Wales, in only eleven years, on between 5,000 and 6,000 schools. The pace seems to have been rapid when we look back,—albeit many of us grumbled when the arrears which had to be made up were constantly in our view. It is somewhat unfortunate that, in so many cases, great things are done,—and then the people who did them, and those who follow after, are at liberty to consider whether what was done was as wise in the details as in the general scope. School planning will obviously be well studied in the future on many grounds,—scientific planning, which has the advantage of being a living art,—useful to the bodies and minds of some human creatures, and to the pockets of others.

Last week (page 38) we gave careful consideration to the subject of a large mixed school, consisting of grouped class-rooms connected with a central hall,—a kind of school which seems likely to come largely into use, or at any rate to be fairly tried in a sufficient number of cases. This week we give illustrations of two schools erected for the St. Albans School Board,—one for 150 and the other for 250 children, which may be taken as good examples of smaller schools now being erected in villages and country towns, by architects who have made a careful study of the subject of education and educational buildings. The views of educationalists with reference to the desirable sizes for schools may be appropriately considered, before a few remarks are made on the kind of schools illustrated.

The relative advantages of small, moderate-sized, and large schools for secondary and the higher education, will probably always be the subject of debate; and it will doubtless be decided as of old that the school should be well suited to the scholar, which is not a mere truism. Although the work in primary schools resembles wholesale dealing as distinguished from dealing with the less abundant, more delicate, and more excellent products, there are keen controversies as to the most useful sizes for such schools also. Of course, in the happy days which are to come, difficulties as to non-attendance at school will not exist, owing to the resolute purpose of parents and children, and distance from a public elementary school, "measured according to the nearest road from the residence of such child," may remain in Section 74 of the Education Act and in by-laws, but never be quoted as a reasonable excuse. Nowadays, however, it is considered inexpedient to tempt too severely those parents who, in their hearts, regard the absence of training as an ancestral privilege, which should be secured for each succeeding generation. The nearest school to such parents' cottages being that to which their children are sent, when sent at all, many of the small schools do good service, in reducing the amount of grumbling which accompanies acquiescence in modern tendencies. Compulsion may be looked on with more pride hereafter; for the present, moral suasion has to do the work in very many places as well as it can. The whole consequences of apathy in parents and children may be put in a somewhat startling form. In 1881, for instance, the number of children from three to thirteen, for whom elementary education should be provided, was reckoned as over 5¼ millions, but the number actually in average attendance was only a little over 2¾ millions. This statement would not convey a strictly correct impression, for children do not and cannot all be expected to attend school for the whole ten years of school life. But all deductions made, it is abundantly clear that nothing should tell against the improvement of school attendance, as it is something secured whatever the standard of efficiency of the school attended may be. It has, however, been pretty well decided that small schools are not desirable except in this way, that they are generally better than no schools at all; as also, that very large schools are not desirable, unless they can have a large and consequently extensive staff. Some authorities, indeed, stand by the rules and do not allow any exceptions.

Of the 18,000 primary schools, 30 per cent. have an average attendance not exceeding 60 scholars. The salaries obtained, even by female teachers, after two years of training, are beyond the means of the managers of a large number of these schools. Article 111 of the new code (1882) is practically a reproduction of the old article 19*d*, and provides that "where the population of the school district in which any public elementary school is situate, or the population within two miles, measured according to the nearest road from the school, is less than 300 . . . . the Department have power to make a special grant, amounting, if the said population exceeds 200, to 10*l*., and if it does not exceed 200, to 15*l*." Calculating the school places at one-sixth of the population, 10*l*. is thus granted for a school of 50 children, and 15*l*. for one of 33. If such special annual grants had been made at an earlier date, it is highly probable that more schools of a very small size would have been erected in country places. The value of these sums of 4s. or 6s. a week in making up the slender stipends of the teachers is felt by the managers in many such cases. These teachers, although they may not have attended training-colleges, are frequently most useful and worthy people,—fitted for their work by a fair amount of preparation,—each having passed through a course as pupil-teacher, and served as an assistant, before obtaining a certificate. In the main, however, these small schools get a bad character for the quality of the education given in them; the judgments beginning with comparisons of some of them with bigger schools to their prejudice, and reaching strong condemnation of others as "extremely bad; their existence can only be regarded as doing harm." There is an impression that children in country schools do not get justice done to them when they are compared with the children in town schools, small schools in outlying districts being selected for the sake of forcible contrast. "Country schools, where the head-teacher is thoroughly competent, receives a fair salary, and has a sufficient staff, compare favourably even with the best of the town schools. Country children breathe purer air, lead healthier lives, and are often better fed than town children. One of the reasons why so many small country schools do not do well appears to be that the salaries offered are often too low to attract really good teachers, whereas it obviously requires as competent a teacher to conduct single-handed a school consisting of 50 children, who are in six different standards, as to conduct a much larger school

* Mr. Mundella, in a speech delivered since this was written, has mentioned 4,538,000 school places, 4,190,000 children on the school registers, and 3,015,000 in average attendance, as the numbers at the present time.

with a proportionate staff. Small mixed schools under a single-handed teacher, who is receiving a very low salary, seldom exist in towns; but so far as my experience of such schools goes, they are no better than, if so good as, country schools similarly circumstanced." Mr. Elliott, who vindicates in this chivalrous way the intelligence of the children of the tillers of the soil, is her Majesty's inspector in the Lincoln district, looking after a population, chiefly agricultural, numbering about 160,000, — about 20,000 children being present on the day of inspection.

In a little over the half of the whole number of schools in England and Wales there is an average attendance not exceeding 100; in accommodation there are only 28 per cent. of that small size. The teaching power, on which the results so largely depend, must be scanty also in such schools,—unless there are liberal contributions from rates or from subscribers to assist in paying the way. When the sole adult teacher is unwell, or is new in his place, the machine moves very slowly, and it stops altogether too frequently. Teachers possessed of talent and training think that their energies are thrown away on a small school, and try to get into a larger sphere; many only take charge of the small schools as first independent charges, and go elsewhere as soon as they can.

The disadvantages of very large schools are strongly insisted on by inspectors and others, who have to do with the immense schools, which have been erected by School Boards in London, Birmingham, Leeds, Norwich, and other large towns. It is not clear, however, that the critics have satisfied the managers of such schools of the error of their ways. Mr. Stokes, in his 1881 report, alludes to the Credon-road School (recently opened, described in the *Builder* of November 11, 1882), just beyond the Bermondsey border. "In regard to this school it is a relief to me personally to reflect that the responsibility for an institution so huge, and so likely in one or another of its parts to breed neglect and mischief, will not fall upon my shoulders,"—being out of his division of Southwark. "I should be glad to know that your Lordships had restricted the size of Board schools within more reasonable limits." But there are considerations which cannot be ignored, such as saving in first cost, economy in maintenance, ease of supervision by managers, high percentages of passes in the standards when there are plenty of class-rooms and plenty of teachers in them; and these considerations have, notwithstanding protests, a good deal of weight, as they ought to have, when rates are to be mortgaged for a couple of generations.

There is safety in a middle course; and a certain warrant for it in practice, for under 10 per cent. of the whole number of schools have an average attendance exceeding 350. Experiments of all sorts may be hailed with satisfaction in the large towns, but some such limit as 350 will continue to be looked upon as a comfortable one in the smaller towns. None of the reasons why very small and very large schools are complained of apply to schools of this size, which means, in effect, that somewhere about this point a capable head-teacher and staff are likely to do their best with the raw material committed to them. The head-teacher can undertake something beyond supervision in his school.

"I do not think a staff should be so calculated as to set the head-teacher wholly free from the responsibility of teaching one class himself. An idea has been some time growing that head-teachers should have their time free for general supervision. Presumably, from more mature experience the head is the most efficient teacher in the school, and yet by the plan now often adopted, the most effective teaching it might command is lost to the school, and especially to the first class, who would naturally profit by it. In our large public schools no headmaster ever thinks of shirking the practical part of teaching, and the responsibility for the work of one class himself. His subordinates are certainly men of some experience, but he has to review and supervise their work. In an elementary school, no doubt, the young staff requires far more constant and careful supervision, and model lessons must be given in their presence, but by good organisation and rigid economy of time it is possible to teach and also to superintend the work of the school thoroughly, as some of our best teachers have proved. I hope the new proposals [of the 1882 Code] may be found to set the head-teachers free from some of their clerical work, and enable them to devote more time to the practical part of their profession."—*Mr. Harrison, H.M. Inspector, Liverpool District.*

One must be contented with a hint as to the important bearing of this upon "specific subjects," the widening of the range of instruction for promising pupils, and upon the character of teachers, spurred to self-improvement, instead of being lulled into content by the even course of duties which call but rarely upon all their powers. These, however, are thorny subjects.

The "Rules to be observed in Planning and Fitting-up Schools," published by the authority of the Committee of Council on Education, are thought to be rather out of date in these days, —when wide rooms, many class-rooms, and central halls are fashionable;—and careful revision at an early date is recommended. On the other side, it is argued that the Rules apply specially to the smaller schools; and, while affording instruction to those connected with all schools, do not confuse by alternative courses put forward with judicial impartiality. Perhaps the weaknesses of those who are likely to use them are unduly considered, and school managers judged with too much severity. Some of her Majesty's Inspectors mingle at times their superior wisdom and tender pity for the world at large,—with special sentiments proper to members of School Boards and other decent people who have the misfortune to be in office, without having attempted to take honours at their universities. Still the maxim that Rules should apply generally, but exceptions should be allowed occasionally, may be at times valued too highly,—as an economy suited to the mass of frail humanity. Such a rule as No. 7: "The width of a boys' or girls' schoolroom *must not* exceed 20 ft.," has an odd look when the London School Board has for years made them 22 ft., and there are plenty elsewhere,—one is illustrated by us this week,—of similar width. No. 11 might daunt some authorities who were thinking of grouping class-rooms after the American fashion, or joining a number with a central hall: "framed wood partitions are not allowed between school-room and class-rooms. They *must be* separated by a lath-and-plaster partition or a wall." These are not suggestions, but distinct directions, with a *must* of a pronounced kind.

Even if the Rules are only to be applied with rigour in the case of the smaller schools, a good deal will still be urged as to modifications and amplifications. We will not attempt much,—merely repeating, without finally approving, a few of the suggestions earnestly insisted upon; —each suggestion being understood to stand by itself, and not to be necessarily in harmony with the others.

1. *Aspect and Lighting.*—Aspect is of the very first importance. School-rooms should derive a good deal of their lighting from the north,—but there should be windows on other sides also, including some windows facing southwards, but not many. When possible, the desks in a school-room should be placed along a north wall, so that the light from the windows in that wall may reach the desks from behind. The windows above the backs of desks should be as high above the floor as they can be, consistently with their giving sufficient light; but other windows should be kept lower, especially the windows on the left of the desks.

2. *Width of Rooms.*—Plenty of width should be given to the rooms, and the width should not be encroached upon by cupboards and other fittings.

3. *Position of Entrances.*—When it can be so managed, somewhere about the centre of the length of a schoolroom is the best position for the door; the children then have to pass less distances in going to their desks and the teacher's desk is near at hand. The cloak-rooms, being near the entrance to the building, should be passed by children going into the playground as well as by those entering the school; that is to say, a special door to the playground should not be put, but the entrance to the school should be the exit to the playground. Sites and their aspects make this difficult, or even impossible, at times.

4. *Class-rooms.*—When there is only one class-room it will be most conveniently placed by the side of the schoolroom, and somewhere near the centre of its length. It will thus be nearer to the head teacher's desk, and the children will generally have to move a less distance when they are taken there out of the schoolroom or back again.

5. *School-rooms not Passage-rooms.*—Rule No. 8 provides that "the class-rooms should not be passage-rooms from one part of the building to another, nor from the schoolrooms to the playground or yard;" but this leaves the schoolroom a passage. Independent access should be provided to the class-rooms from the lobbies, so that they may be cleared without the schoolroom being entered. The advocates of the "hall-passage system" for middle-class schools look upon the hall as the passage to and from every part of the building; but the halls in such buildings are not used for the same purposes as the schoolrooms in primary schools.

COVENT GARDEN MARKET-PLACE.

THE Metropolitan Board of Works has received a communication from the Duke of Bedford offering to enter into negotiations for the sale of Covent-garden Market, and as there is every probability of a change of ownership, with a possible disappearance of the market, a few words concerning the history of the market-place may be interesting and *apropos*.

Parton, in his history of St. Giles's-in-the-Fields, gives a plan of the parish and its boundaries as they appeared *circa* A.D. 1300, in which the garden of the Abbot of Westminster occupies the site of the present market, lying between the Via Aldwych (Drury-lane) and the Via de Westmonaster (St. Martin's-lane), the northern boundary being an unnamed lane, to be afterwards known as The Elms or Elm-close, then as the Seven Acres, and then as Long Acre. The Abbot's garden and the land within the enclosure were granted by Edward VI. to his uncle, the Duke of Somerset, and in 1552, there was a patent granted to John, Earl of Bedford, on the attainder of Somerset, of Covent-garden lying in the parish of St. Martin-in-the-Fields, next Charing-cross, with seven acres, called Long-acre, of the yearly value of 6*l.* 6s. 8d. In 1645, Covent-garden was made into a parish of itself.

We gather from Strype that about 1634-35, the Earl of Bedford pulled all the old buildings down, and cleared away the rubbish that, for a century and more, had disfigured the ground, and in lieu of "thatched houses" and "hovels" arose "several fair streets, strait and uniform. . . . . About the centre of the ground he caused to be set out a large square, or rather oblong piece of ground, 500 ft. in length, and 400 ft. in breadth. . . . In the midst of this plot or space, since called Covent-garden, within rails, is a stone pillar or column raised on a pedestal ascended by steps, on which is placed a curious dial, four square, having above it a mound gilt with gold, all neatly wrought in free stone." Cunningham, in his Life of Inigo Jones, differs from Strype in regard to dates. The square was formed (by Inigo Jones) about the year 1631, though never completed. The Arcade, or Piazza, was carried along the whole of the north and east, the church completed the west, and the south was girt by a grove of trees and the garden wall of Bedford House (taken down in 1704) in the Strand. The northern side was called the Great Piazza, the eastern the Little Piazza. St. Paul's, the parish church of Covent-garden, was commenced by Jones in 1631, and consecrated seven years afterwards. "I don't want to lay out much money on the building," said the Earl of Bedford to Jones; "in short, I would not have it much better than a barn." "You shall have the handsomest barn in England," replied the architect. This "barn" was burned down in 1795. "On the 17th of September," records the *Annual Register*, "about ten o'clock a fire broke out in the cupola of St. Paul's, Covent-garden, which communicated to the roof, and in two hours consumed the whole inside of that very beautiful building." Then comes the oft-repeated story, "The fire was occasioned by the carelessness of some working men who were repairing a part of the lead-work about the cupola. The original cost of the building was no more than 6,500*l.* Its repairs, about six years since, were charged at 10,000*l.*" In the *Annual Register* of 1786 we read that,—"At about five o'clock in the morning [March 17] a fire broke out at a distiller's in Great Russell-street, Covent-garden, which entirely consumed all the houses up to the [south-eastern] piazza." Among the houses consumed were, "Mr. Rigg's Hummums, two peruke-makers, and great part of the Bedford Arms tavern and the piazza. The whole front of the said piazza fell down about eight o'clock with the most terrible concussion." The church was rebuilt of stone by the eldest Hardwick, on the plan and in the proportions of the original structure. The portion of the piazza which fell was never rebuilt, but the Hummums was, and exists to this day as a hotel.

To confine ourselves to the story of the market-place. In Rocque's plan of London (1737-46) the market-square is represented with shops on the south side and stalls behind them, and the dialled pillar in the centre. In a mock-heroic poem, entitled "Tom King's; or, the Paphian Grove," "Printed for P. Sambroke, under the Piazzas, Covent-garden, 1741," referring to the market-place:—

"High in the midst of this most happy land,
A well-built marble pyramid does stand,
By which spectators know the time of day
From beams reflecting of the solar ray:
Its basis with ascending steps is graced,
Around whose area cleanly matrons placed,
Vend their most wholesome food."

The writer, in a note, tells his readers that upon these steps sit several old women who sell hot rice-milk and barley-broth. After this the writer takes a bold flight:—

"When the Omnipotent, with dread command,
Banish'd our parents from blest Eden's land,
'Another garden,' said he, 'I will give,
In which with pleasure ye may happy live;
Second to Eden only but in fame,
For bliss and constant spring exact the same:
To the happy spot let Convent be the name.'"

A view of the market in 1820 represents the shops and stalls shown in Rocque's plan, while the north side is covered with a jumble of tents and stalls.

Mr. Charles Richardson writes, in 1817, from the "Hotel, Covent-garden," of which he was the proprietor, to the *Gentleman's Magazine* concerning a painting by Hogarth in his possession:—"The subject is a view of Covent-garden Market. . . . . In the centre, seated by the column, with vegetables before her, is the figure of a very handsome woman well known by the name of "The Duchess." Her second husband's name was Wharton, and among her numerous admirers was the eccentric and profligate duke of that name. On the left-hand corner of the picture are an old couple whose name was Blake. Mrs. Blake is in the act of frying sausages and smoking. Near them is a man in a red waistcoat serving out rice and milk. This portrait is also represented in the "Morning" of this artist. The conspicuous figure standing in front of the church is George Carpenter, who, when a boy, made his living by carrying empty fruit-baskets to the waterside for the market gardeners." Carpenter married; took a public-house, acquired considerable property, and after the death of Mr. Gyfford, a brewer, "became lessee to the Duke of Bedford for the market at 14,000*l.* yearly. The man in the Quaker's dress is Crow, who had in his younger days been coachman to the celebrated Duchess of Marlborough, and became collector of the tolls of the market for Mr. Gyfford. The column was taken down about twenty-five years ago."

The same magazine on May 18, 1827, records: "Died aged 67, Mr. Charles Richardson, of King-street, Covent-garden. . . . . He for some years kept the hotel in Covent-garden called by his name. He was a great collector of everything relative to the parish of St. Paul, Covent-garden."

The present market buildings were erected by the Duke of Bedford in 1831, the late Chas. Fowler being the architect. A few years ago the open spaces on either side were partially roofed in, and a flower-market built at the side of the Hummums Hotel, with entrances from Wellington-street and Covent-garden.

The Old Law Courts at Westminster.—Orders have been given by her Majesty's Commissioners of Works and Public Buildings that all the valuable building materials comprising the block of buildings known as the old Law Courts at Westminster, adjoining Westminster Hall, shall be sold by public auction in lots, by Messrs. Horne & Eversfield, on Monday next, the 22nd inst., and following day, at one o'clock. The lots offered comprise, among other things, about 1,000,000 sound bricks, timber roofs and floors, square floor boards, oak linings, partitionings, wainscoting, seatings, about eighty tons of lead, and numerous other fixtures and fittings. The courts may be viewed this Friday and Saturday, the 19th and 20th of January.

Christ Church Cathedral, Dublin.—A costly and beautiful book, giving an account of the restoration of this building, by the late George Edmund Street, R.A., with an historical sketch of the Cathedral, by the Rev. Edward Seymour, M.A., and a dedication by Sir Theodore Martin, has just now been published by Sutton Sharpe & Co., Queen Victoria-street. We shall take an early opportunity to speak fully of it.

CENTRAL TOWER, PETERBOROUGH CATHEDRAL.

EVERY ONE who is in any way interested in Gothic architecture must be grieved at hearing that the destruction of the central tower of Peterborough Cathedral has been considered necessary. We do not, for one moment, challenge Mr. Pearson's opinion as to the necessity of carrying out this unfortunate piece of destruction, but we cannot understand how things should have been allowed to go so far as to render such an operation necessary.

The unsatisfactory, not to say dangerous, condition of the piers supporting the lantern at Peterborough is no new story, as is proved from the following passage in Winkle's "British Cathedrals," published in 1838:—"The central tower is built upon four clustered columns, and the same number of arches. . . . The column at the south-east angle is now banded together with iron, and seems to be in a very tottering and dangerous condition." Now, if this was the case in 1838, it is not surprising that the tower should, in 1883, threaten ruin. Surely if this had been attended to when these defects were first notorious, some means might have been arrived at of averting the danger; for instance, the tower might, without any very great difficulty, have been shored up and the pier which was "in a tottering and dangerous condition" taken out and rebuilt. We presume that it is now too late to do this, as the tower itself appears to be in such a very unsound condition; but it is strange that this not very difficult operation has not been attempted before matters arrived at their present unfortunate condition.

The fate of this tower, however, may be a lesson to us for the future, and we suggest that a careful examination of all the central towers of English cathedrals and churches should at once be made, with a view to ascertaining the condition of their supports. Either this should be done by those in whose care these buildings are vested, or it might be made a Government question; but certainly the public have a right to demand that the safety of these structures should be inquired into. We should, for instance, like to know what is the condition of Salisbury, of Norwich, and of Lincoln. Are we to read in the paper some morning that some eminent architect has been telegraphed to because one of these towers "shows signs of falling in"? Let it be borne in mind that the accident at Peterborough is nothing new. Hereford, Chichester, St. John's Chester, Fritzlar, and Breslau have all warned us of the danger.

We cannot help thinking that the old-fashioned plan of having cathedral architects appointed, with regular yearly stipends, whose duty it should be to attend to the structural repairs of the building, would avert a good deal of danger,—men who, being on the spot, can watch the building from day to day, and who would not have to be telegraphed for from London when the building is absolutely tumbling down. Of course, when very important repairs or restorations are necessary, the local man might have associated with him some eminent London architect, just as people living in the country have a local doctor to attend them as their family medical attendant; but in cases where he considers it advisable, some more eminent practitioner is summoned to give advice. Every English cathedral ought to have its resident architect, who ought to be paid by the year, and who should be responsible to the dean and chapter for the state of the building. With the vast revenues attached to our cathedrals, the least we can expect is that they should not be allowed to fall down, or allowed to get into such a condition as to render pulling down necessary. But without the appointment of some resident architect, how can such a fate be avoided? The clergy cannot possibly know anything about such matters, as only a practical architect or engineer can tell whether there is or is not danger threatening until it is too late to avert it.

If the revenues of any particular cathedral are insufficient to support a regular cathedral architect, surely some Government grant might be applied for, or some Government official (being, of course, an architect) appointed and paid by the Government. To preserve our ancient cathedrals is a serious and sacred duty, and we are responsible to those who come after us to hand these buildings down to them in as genuine a condition as possible; they will not thank us for handing down to them our imitations of old work, where, by a little care, we might have saved the genuine ancient work. Of course we know that all buildings must eventually submit to the destruction of time, and we do not intend to discuss the questions which have recently divided archæologists into two camps concerning the advisability of restoration, but we think that even the least conservative architect would acknowledge that it is better to preserve an old building where it is practical than to replace it by a modern imitation; and in a wealthy country like England the mere question of a few hundreds a year paid to some architect to watch and take care of a vast cathedral ought not for a moment to be allowed to weigh in the balance against the danger and loss sustained by any neglect of these magnificent examples of ancient art.

We presume that the Peterborough tower will be rebuilt as nearly as possible to its present design, though, perhaps, the pinnacles, which date only from the end of the last century, ought to be omitted, or re-designed, as they are singularly ugly and out of place.

A drawing by King, in the *Monasticon*, shows this tower as crowned by a stumpy octagonal lantern, apparently of wood; and in earlier times there can be no doubt that this was capped by a lead or slate-covered wooden spire. When King made his view the leaden spire still existed upon the great bell-tower at the north-west of the west front, but that crowning the lantern had even then disappeared.

If the design for Peterborough Cathedral had ever been completed, it would have possessed five spires, two of stone and three covered with lead. The two stone ones alone remain at the present time.

We will next week give a view of the cathedral.

The following is the letter sent by Mr. Pearson to the Dean, acting upon which it was resolved to remove the tower:—

"13, Mansfield-street, London, W., Jan. 2.

Dear Mr. Dean,—I yesterday again carefully examined the central tower, and with very great regret I have to report that the settlements are decidedly much more marked than when, a few months ago, I looked at them, and there are besides several new cracks being developed. It is perfectly evident, therefore, that the greater part of the tower is in more or less a state of movement, and, as it is impossible to say when or how this might be seriously accelerated, I would strongly advise that the services in the choir and those just outside the choir be discontinued. This may appear a strong measure to recommend, but, looking at the state of the tower, I feel that I should not be justified in doing otherwise. I further advise that very nearly the whole of the upper part of the tower be taken down, so as to relieve the arches of the crossing and the piers of as much weight as possible, and also to prevent the possibility of any of it giving way suddenly, and cutting through the roofs to the floor below. The pulpit, organ, and screen had better be removed at once. The nave can easily be arranged so as to adapt it for the services, and the organ can be put up behind the temporary stalls.

Believe me to be, dear Mr. Dean,
Yours very faithfully,
JOHN L. PEARSON.

The Very Rev. the Dean of Peterborough."

The Dean writes,—"The first step to be taken was to guard as far as possible against accidents and to provide for the continuance of the services. The fine organ standing on the screen, and the massive stone pulpit erected in memory of Dr. James, a former canon of the cathedral, from the designs of the late Mr. E. M. Barry, were both immediately under the central tower, and it was of the greatest importance to remove them before touching the tower. A telegram was sent to Messrs. Hill, the builders of the organ, and they lost no time in sending down some of their men to superintend its removal. This has now been safely effected. The family of the late Dr. James have generously offered to remove the pulpit at their own cost and to re-erect it hereafter, and this will be accomplished with as little delay as possible. Late on Saturday night the preparation of the nave for Divine service was completed. We are fortunate in having on the spot a builder, Mr. John Thompson, whose large experience at Chester, Ripon, and other cathedrals where he has been employed, has fitted him admirably to cope with such an emergency as this. He has sent for two steam cranes, and is making every preparation for taking down, under Mr. Pearson's direction, the three shattered sides of the tower."

Canon Venables, with regard to the future arrangement of the choir, says:—

"It may seem premature to express any opinion as to the reconstruction of the choir, when all efforts are being concentrated on rescuing the lantern and the adjacent portions of the cathedral from the destruction that threatens them. But I trust I may be permitted to express my earnest hope that, when the time shall have arrived, the choir may resume its original dimensions, which were so sorely curtailed half a century since by the late Mr. Blore, during the restoration under the auspices of Bishop Monk, who then filled the decanal seat. The old monastic choir, as at Norwich, Westminster, Winchester, and other Benedictine churches, occupied the lantern space, and some of the easternmost bays of the nave. If I am not mistaken, the choir-screen at Peterborough, as now at Norwich, stretched across the nave at the first pier of the lantern, a second screen standing as in that cathedral at the second pier. . . . . The close stone screen, a modern work of Mr. Blore's, forms an impenetrable barrier between worshippers in the nave and the ministrants in the choir. This is now being taken down, and I trust may never be put up again,—certainly not in its old place. I would say the same of Mr. Blore's woodwork. When the choir is reconstructed after the completion of the substantial repairs, an opportunity will be afforded of reproducing the old Benedictine arrangement which I trust will not be lost. Light low screens should be erected across the transepts. A screen of open woodwork, such as those at Winchester and Chester, should mark the western limits of the choir. I should wish to see the organ re-erected in its old place in the centre of this screen.

May I add a word in support of the recommendation that the central tower, when rebuilt, should be heightened by at least one story? At present it is miserably low, and quite out of proportion with the rest of the building. As originally built by Abbot William of Waterville, in 1154, this '*magistra turris*' rose three stories above the roof. But the legs were unequal to the weight, and, some time in the fourteenth century, the grand fabric was taken down and the present feeble lantern constructed, the cathedral in consequence losing its crown of glory. I see from his printed report that Mr. Pearson considers this 'a matter well worth consideration.' I trust it may be not only considered, but carried out."

Mr. Pearson states that the south-eastern pier of the tower shows singularly conflicting indications of failure. The pillar is depressed on the choir side at the triforium level to the extent of 3 in., on the transept side to the extent of 6 in., and at the clearstory level to the extent of 4¾ in., while the arches on both sides are distorted. The lantern stage of the tower is in a dangerous condition; there are large rents in the walls following up others which show themselves distinctly over the main arches. There are other fractures in almost every direction, and many large pieces of the stonework of the windows appear to be on the point of falling.

PUBLIC WORKS AND BUILDINGS IN LONDON AND SUBURBS,

IN THE SIXTEENTH, SEVENTEENTH, AND EIGHTEENTH CENTURIES.*

A.D. 1600-1601. The next bill in this account amounts to 2,540*l.* 14s. 9¾d. for works and buildings "made and donne vpon her Ma^ts^ house of Whitehall, alias the newe Pallace of Westminster and diverse other places thereonto belonging and adioyninge," viz.: Masons occupied in planing and squaring Reigate paving, and new bottoming an oven in the pastry; mending with new and old stones sundry ovens in the house; breaking sundry holes in the arbour in the privy garden; mending the stone battlements over the chapel and great chamber "with divers mantles and jambes of chimneys aboute the house"; mending and paving in the privy kitchen and other kitchens about the house; mending the Purbeck paving in the place where the crane is made for taking up the beer; repairing with Caen stone the pinnacles over the hall; making new boards for divers chimneys about the house; making a "longe steppe" of Caen stone for the door out of the great chamber into the closet; working Caen stone for windows in the outer room of the chapel, cleaning, fitting, and setting up to stone panels in the still-house with border, and other work done there; making a furnace for the library next the privy chamber to air the books; working upon two stone windows of Caen stone, the one of four lights, and the other of three lights, in the outward room within the chapel; cutting away in stone buttresses and water-tables to place six great seats for the Queen in the privy garden, and setting up ironwork in sundry stone windows; making and setting up seven stone "beasts" with sundry other works. Carpenters occupied in fastening and hanging up the new arbour over the privy garden door with six long irons; working and setting up two long bases and four columns under the end of the privy bridge next the stairs; making and setting up a clearstory window with two lights over the gallery next to the bear-stake; making scaffolds about the privy bridge of the Thames; cutting boards into ledges and nailing them on the two rows of timber pieces; making and setting up of some timber pieces that were wanting there; working upon the causeway of bridge at the orchard there; listing and laying deals at the banqueting-house end, and in sundry places on the walk in the preaching-place; laying great long joists and planks for a bridge near Fulham; repairing the watergate bridge at Whitehall, and a bridge near Chelsea, at a gate called Bloody Gate; cutting out a chimney-way with a timber roof in the Prince's lodgings; quartering up a pane in the Banqueting-house; new joisting and planking a bridge out of St. James's Park unto Long Ditch; mending the King's Bridge at Westminster with new planks; mending and setting up of sundry partitions; new boarding and repairing divers floors in sundry rooms and lodgings; making a new frame of timber, with two pair of stairs and great "halpaces," under the Queen's window; making a new frame for the Ambassadors against the running day [tilting on St. George's day]; mending tables, trestles, cupboards, and forms; dressers in the kitchen; boarding a wall and mending a floor in the great bakehouse; making and mending sundry doors; hewing and setting up dressers; making ready the Great Chamber on the king's side with degrees and deals against Christmas; setting up a rail on the water bridge; making and setting up a "trevesse" in the chapel; making and setting up presses in sundry places; mending the pastry-wall with boards, and sundry other walls; framing and setting up and boarding a shed in the pastry-yard; making ready the Hall, the Lord Chamberlain's stand, the new year's gifts chamber, and sundry cupboards for plate in Christmas time, and of the Great Chamber for a play after Twelfth-day; making and mending sundry posts, "wayles," and bars; making a great cistern-case for the scalding-house; boarding decays in the Close tennis-court roof; mending the wood-yard privy; making a frame to hang pikes on in the scullery; attending at Essex House to break open doors in the night; listing planks and laying joists in sundry places; framing and setting up a new bridge near Scotland Wharf, and ripping the same wharf; making up a timber wall between Adam and Eve Chamber and the banqueting-house; making and setting up two clearstory windows in the Lord Treasurer's lodgings; setting up shores in the still-house cellar; framing and setting up a new arbour on the lead roof next the orchard; "furringe of rafter in sondrie places"; making nine mortar-tubs and working up a small roof, with gable ends, for the little tennis-court; working upon the framed timber roof of the long range of the new buildings next the street where the officers of the household lie; framing and setting up dormers for the up windows of both sides of the same long roof; making new stairs for the said new buildings; joining and boarding gutters in the Long Gallery, next the brake and in divers other galleries, rooms, and chambers; framing and driving poles in the great pond by the lodge; rearing up a great staircase at Sir Thomas Knevitt's in St. James's Park, with divers other staircases, portal, and divers windows and window shuttings, and repairing those that were broken and decayed, with other necessary works. Bricklayers and tilers ripping, pointing, tiling, and slating the one side of the hall next to the Thames, and over sundry chambers, offices, and lodgings; making and mending footpaces and backs of chimneys, paving sundry floors and rooms with bricks; bringing up a chimney in the privy lodgings, repairing the furnaces, sinks, ovens, and sundry hot-houses; forcing a little timber window in the spicery lodgings; making a new furnace and foot-pace up to the lead in the boiler-house, and divers such like works and repairs. Plumbers ripping, scouring, and soldering sundry pipes of lead; mending the conduit heads, cisterns, and leads; setting on and mending brass cocks; laying a new trough with a spout, a cistern, and a square pipe, all with new lead, for the turning of a water-course over the privy gallery down into the preaching-place; laying new lead on the roof over the privy bridge and the washing-place in the Queen's waiter's chamber; turning the conduit-pipes that came up behind the withdrawing-chamber door to come up to the stool-house [qy. w.c.] near the same chamber. Searching and mending faults and crack upon the Parliament House, bestowing new lead in some places on the roof of the Lower House, with other necessary works. Joiners working, framing, piecing, and setting up tables, forms, shelves, brackets, trestles, portals, and lattice-windows; making a box for the Lady Warwick; making and repairing cupboards, screens, doors, and casements; planning, laying, and mending sundry sail-boards in the priving lodgings; fastening and lining an old wainscot in the garden-house. Plasterers lathing and laying with lime and hair sundry ceilings, both old and new being decayed. Mortaring the windows after the glaziers, and laying sundry rooms and floors with plaster and other such-like works. Matlayers new matting and mending the old mats in many chambers, lodgings, and closets, and mending the old therein. Glaziers taking down glass out of sundry windows, and laying it up. Mazer-scourers cleansing and scouring vaults, sinks, and channels, and burning soil. Paviours new mending many places in several offices and entries. Labourers serving and attending the said workmens, and doing sundry needful works and businesses, for the performance of which work divers provisions were made, which, with their prices and quantities, carriage, and wages of the workmen and labourers, with other charges, are particularly expressed as follows:—

Oak timber: 2 loads, 26½ feet, at 22s. the load; 3½ loads at 17s. 4d. the load; 1 load, 8 ft., at 16s. 8d. the load; 2 loads, 12 ft., at 15s. 8d. the load; 20 loads, 29½ ft., at 14s. 10d. the load; 12 loads, 28 ft., at 13s. 4d. the load; 5 loads, 7 ft., at 24s. 4d. the load; 8 loads, 23 ft., at 14s. the load; 3½ loads, 1 foot, at 12s. 4d. the load; 4 loads, 41 ft., at 11s. the load; and 6 loads, 32 ft., at 10s. the load,—in all, the sum of 104*l.* 15s. 11¼d. Elm timber: 2 loads, at 15s. 8d. the load, 1*l.* 11s. 4d. Ashwood: 2 loads, at 8s. the load, and 2 other loads at 8s. the load,—in all, 1*l.* 10s.

Boards: 2 loads of oak boards at 14s. 4d. the load, 1,174 ft. at 5s. 4d. the hundred [M^l^.C. di xxiiij foote at v^s^ iij^d^ the C^th^.], 41,595½ ft. at 5s. the hundred [xlj ^m^ v^c^ iiij^xx^ xv foote di at v^s^ the C^th^.], 127 ft. at 4s. and 4s. 6d. the hundred, 484 ft. at 3s. 4d. the hundred, 356 ft. at 9s. the hundred, and 800 at 8d. and 10d. the hundred,—in all, the sum of 123*l.* 15s. 9¼d.

Planks: 6 loads, 3 ft., of "forme planckes" at 18s. the load, 68 ft. of 4-in. at 4d. the foot, 33 ft. at 3½d. the foot, 73 ft. at 4d. the foot, and 16 ft. at 2½d. the foot,—in all, the sum of 8*l.* 2s. 5d.

Quarters, joists, and rafters: 9½ loads at 19s. 4d. the load, half a load at 16s. 10d. the load, 3 loads at 12s. the load, and 61¾ loads, 1½ foot, at 18s. the load,—in all, the sum of 67*l.* 1s. 10d.

Joiners' work: 3 tables, 2*l.* 4s.; 1 portal for the Lord Admiral's chamber, 25s.; a wainscot panelled door, 8s.; frames for maps and pictures, 14s.; wainscot shuttings and leaves, 2*l.* 7s. 5d.; and windows for the tennis-court, 18*l.* 8s.,—in all, the sum of 25*l.* 6s. 5d.

Stone: 362 ft. of Reigate paving at 6d. the foot; "Hardstonne pace," at 16d. the foot; 55 ft. of Borderstone, at 9d. the foot; two tons of Oxfordshire stone, to make seven beastles for the gable-ends next the street, 7s. 4d.; and two loads of "pibble" stones, 4s. 8d.,—in all, 12*l.* 18s. 3d.

Billets: 12,700 at 10s. the thousand; 3,000 at 9s. and 9s. 6d. the thousand, and 1,000 at 8s. 8d.,—in all, the sum of 8*l.* 2s. 8d.

Tallwood: 2 loads, 8s. 6d.; 1 load, 6s.; 12 loads at 4s.; and 46 "shedde," at 3s. 10d.,—in all, 3*l.* 11s. 4d.

Norway deals: 770 at 16d. each, and 40 at 14d. each,—in all, the sum of 54*l.* 16s. 8d.

Meborough deals: 460 at 14d. each, 26*l.* 16s. 8d.

Bomesparres: 280 at 12d. and 10d. each, 13*l.* 10s.

Clapboards: 20 at 6d. each, 10s.

Mats: 368 pieces of coarse mats at 1s. 8d. the piece, 375 pieces fine at 3s. 4d. the piece,

* See *Builder*, vol. xliii., p. 852; and p. 23, *ante*.

and 6 pieces of double fine mats at 6s. 8d. the piece,—in all, the sum of 95*l.* 3s. 4d.

"Punchions": 1 load, 12s., and 22 "ponchions" at 8d. each,—in all, 1*l.* 6s. 8d.

Hurdles: 12 doz. at 4s. the doz., 2*l.* 8s.

Lead: "xij^{ml} CCx^{ma} lvj^{lb}, mzt at xij^{s} the Cth. lxxiij^{li} ix^{s}, ob.; Pypes of leade, xxvij^{li} iij^{s} vi^{d}., and for the castinge of xvj^{ml} iiij^{c} iij qrt^{rs} of olde leade at xx^{d} the Cth, xiij^{li} xiij^{s} vj^{d},—in all, 87*l.* 7s. 0½d."

Soder: "Cviij^{ma} qrt^{rs} xvij^{lb}, mzt at 6^{d} the pounde," 23*l.* 10s. 5d.

Hair: 162 boz at 6d. the boz; 77 boz at 5d. the boz; and brush hair at 6s.,—in all, 5*l.* 19s. 1d.

Straw for the plasterers, 13s. 2d.

Nails of sundry sorts and prices, 16*l.* 7s. 4d.

Copper nails and lacing-wire, 1*l.* 13s.

Ironwork of divers kinds, 161*l.* 18s. 10½d.

Parchment, "for a platte of Depteford House," 8s.

"Assidue": 12 lb., 24s.; and "for castinge it," 12s.;—in all, 1*l.* 16s.

Glass and workmanship at the rates usual and accustomed, 103*l.* 18s. 11½d.

Packthread: 300 lb., at 8d. the pound, 7*l.*

Size: russet, black, and white, for the painters, 2*l.* 7s.

Red ochre: "Vj^{c} di x^{lb} mzt at ix^{s} iiij^{d} the hundreth," 3*l.* 8s. 10d.

Leather threads: 16 boz, at 12d. the boz, 16s.

Earthen pots to boil colours in, 8d.

Brasswork: 8 cocks, at several prices, 2*l.* 6s. 8d.; a brazen head for the top of the crane (besides 2s. 4d. abated for old brass), 13s. 5d.; cement and setting on of cocks, 9s. 2d.; and for 9 ells of canvas to bind the broken pipes with, at 16d. the ell, 12s.,—in all, 4*l.* 15s.

Bricks: 125,000, at 10s. 4d. the thousand; 28,000, at 11s. the thousand; 57,000 of "hewinge brickes," at 12s. and 12s. 6d. the thousand; and 8,500 at 13s. the thousand,—in all, the sum of 120*l.* 1s. 11d.

Tiles: 67,000, at 11s. the thousand; and 7,000 at 12s. the thousand,—in all, 41*l.* 1s.

"Russetyles": 1,042, "at a penny the piece," 4*l.* 6s. 10d.

Paving tiles: 2,000, at 4s. 5d. and 6s. the hundred, 5*l.* 6s.

Tile-pins: 56 boz and 1 peck, at 16d. the boz, 3*l.* 1s. 6d.

Masts: 12 small masts, 4*l.* 16s.; 4, 2*l.* 8s.; 3, 2*l.* 5s.; and one great mast 1*l.* 2s.,—in all, 10*l.* 11s.

Laths: 30 loads, at 22s. the load; 1 load, at 21s. 4d.; 2 loads, at 18s. 8d.; and half a load, 8s.; 4,800 "gapline" laths, at 8d. the hundred; 1,700 hearth laths, at 9d. and 10d. the hundred,—in all, the sum of 28*l.* 19s.

Lime: 14,234 lb. mzt., at 6s. the cwt., 42*l.* 14s. 0½d.

Sand: 249 load, at 8d. the load, 8*l.* 6s.

Loam, gravel, and clay: 164 loads, at 10d., 12d., and 14d. the load, 7*l.* 7s. 4d.

Hothouse pots: 4, 6s.

Baskets: 36, at 4d. each, 9s.

Shovels: 40, 1*l.* 3s. 6d.

Paper: royal pot paper, counters, dust, quills, and such like necessaries, 5*l.* 18s. 11d.

Candles, links, and tallow, 4*l.* 2s. 2½d.

Small necessaries: brooms, glue, soap, &c., 3*l.* 10s. 1d.

The workmen employed included masons, carpenters, bricklayers, tilers, plumbers, joiners, sawyers, plasterers, glaziers, paviors, matlayers, wire-drawers, mazer-scourers, labourers, and four clerks of works, whose daily wages were at about the same rates as those above mentioned. It does not appear that there were any apprentices paid for work done under this head at Whitehall Palace, which amounts to 721*l.* 15s. 0½d.

The taskwork included a payment of 16*l.* to William Brice and Paul Ward, carpenters, for making six seats for the privy garden, "being arched wth pillasters, architrave, freese, and cornishe, wth tapgills and covers over the heade borne with cantilevers at lx^{s} the pece, he findinge all manner of stuffe and workemanshippe"; and for working a gate at the orchard stairs with two leaves with "ballasters, complimente wth architrave, freese, and cornishe, the arche cutt through," 3*l.* 16s.

Robert Yorke, carpenter, for making pair of new stairs in the gallery between the great chamber and the chapel, 20s.; and for making another pair of stairs with case for them up to the Clerk of the Green Cloth's chamber, 25s.

William Suthes, mason, for cleaning a pair of stone arms, making a moulding of stone about the crown thereof, and for taking down and setting up again four old stone pells in the long range, 12s.

Leonard Frice, serjeant painter, for painting, stopping, and laying in oil-colours six great stone windows, 2*l.* 8s.; for laying in lead twenty-five casements, at 6d. each, 12s. 6d.; for laying in oil-colours seventy-two bars, at 1d. each, 6s.; for priming, stopping, and laying white in oil and working with "gillosses and rebeste worke viij greate postes, vj rayles, and xlj ballasters, vj^{li}"; like priming and stopping six beastes, laying them in their proper colours, and gilding them in oil, with rich gold, at 34s. 4d. each, 10*l.*; laying in with white lead in oil nine clearstory windows, at 3s. 4d. each, 2*l.* 6s. 8d.; laying in lead colours eleven wainscot casements, at 10d. each, 9s. 2d.; laying in russet water-colours a chimney pell in the closet, and for laying the side-walls and overhead on the stairs, from the closet down to the chapel, and for laying white in distemper upright bars and lockets, 17s.; cleansing a chimney-piece in the Council-chamber, and laying two rails on the terrace in white and black, 7s.; laying forty-four shores in russet colours, 39s. 4d.; laying a seat white and working "rebeste" in distemper, in the garden, 13s.; priming, stopping, and working with "rance and jasper," in oil-colours, six great seats, at 28s. 4d. each, 8*l.* 10s.; like working and laying in oil colours of the great gate upon the orchard bridge, 20s.; working with fine colours, in rich gold, of the dial right against the Queen's privy lodgings, 10*l.*; laying in black a great frame and gilding two great "boatles" round about it, and mending "the mappe of the Prince of Orrendge his warres," in the same frame, 13s. 4d.; priming and japanning a pillar with rance, 6s. 8d.; stopping and laying stone-colours in oil upon a great frame of timber on the leads next unto the orchard, 30s.; laying in oil-colours another great frame of timber in the privy garden, 24s.; for laying brown in oil a small timber frame in the preaching-place, 6s.; priming and laying in oil-colours 132 yards of lattice, in the tennis-court windows, at 16d. the yard, 8*l.* 16s.; priming, stopping, and working with jasper in oil of some works about the cocks in the privy garden, and for working the pavement of the foot-paces with oil-colours, containing 36½ yards, at 16d. the yard, 1*l.* 19s. 9d.; laying in lead-colours forty double casements, at 6d. each, 22s.; working with fine gold her Majesty's arms in the new buildings, 14s. 4d.; and for laying in lead-colours 352 iron bars, at 1d. each, 39s. 4d.,—in all, the sum of 62*l.* 17s. 1d.

Sebastian Viccars, carver, for carving a taffrail on both sides with a badge in it over the stairs at the orchard gate, 1*l.* 6s. 8d.; cutting seven beasts in stone for the gable ends of the new buildings towards the streets at 16s. 8d. each, with 2s. for sawing stone for the same beasts, 5*l.* 8s. 8d.,—in all, 7*l.* 5s. 4d. John Bucton and other plasterers and tilers for new lathing and laying 30 rods square of tiling work over the little close tennis-court, next the park, and the gallery adjoining, 3*l.* 15s.; ripping new lathing and tiling a new cross roof on the tennis-court, and for like work done in other places, containing 16 yards at 2s. 6d. the yard, 2*l.* 2s. 6d.; like work done upon Lady Burghes' lodgings, and the offices adjoining to the bowling-alley, 3*l.* 2s. 6d.,—in all, 9*l.*

William Stevenson, Anthony Woolmer, and other bricklayers, for taking down an old stone wall, and making the same up again with bricks, 160 ft. in length, 6 ft. in height, and 3 bricks in thickness, and for digging and ramming the foundations, 6*l.*; for making a return of 18 ft. long, 18 ft. deep, and two bricks in thickness, with two door-cases and eight lights of windows, 3*l.* 10s.; for colouring and pencilling the brick walls of both sides of the new buildings, 8*l.* 13s. 4d.; for tiling two squares of the old buildings next the gate, 5s.; for making the gable-end of bricks next Scotland [yard] and one chimney in the same from the ground, and taking down two chimney-tops in the same gable-end and making them up again, 6*l.*; for making and finishing a brick window of three lights in the same gable end, 8s.; bringing a foundation with bricks next to the great coal-house, 6s. 8d.; underpinning with bricks the ground plate all the length of the gallery, and seven partitions in the new building, 1*l.* 15s.; mending with bricks the foundation in the chandlery, 15s.; finishing twelve chimneys in the new building, 7*l.*; making a new chimney-shaft in the new buildings, 7*l.*; making a new chimney-shaft in the wood-yard, with other works, 22s.; bringing up a brick wall at the jewel-house, and making a brick window there of three lights, 1*l.* 5s.; mending sundry chimneys in the new buildings, paving the wardrobe with bricks, and for underpinning a staircase there, 3*l.*; making a vent for the house of office, and tiling the same, 2s.;—in all, the sum of 39*l.* 6s. 3d.

The same William Stevenson and other bricklayers, for their task in digging the foundations, bringing up with bricks the two sides of the old timber range, being two stories and a half in height, with twelve gable-ends; making with bricks, and finishing with mortar on both sides of the same building, 218 lights, with tiling all the roof of the same; the Queen's Majesty finding all manner of stuff, and they but the workmanship only, being let to them by great for the sum of 120*l.*

John Cleane, tiler, for ripping new lathing, and laying 14 rods square of tiling work over the clerk of the kitchen's chamber next to the chandlery, at 2s. 5d. the rod, 1*l.* 15s.

William Phillips and others, turners, for turning two columns, 6s.; 50 post-heads with acorns, for the rails before Whitehall, 1*l.* 13s. 4d.; turning a roll for the platters of Deptford House, 12d.; like turning 17 post-heads and 35 balusters, 23s. 8d.,—in all, the sum of 3*l.* 4s.

The Lady Southwell, for money by her ladyship laid out for the repairing of the house called Hances House, sometime appointed for an armory, adjoining her Majesty's orchard at Whitehall, as appears by the particulars thereof viewed by the officers of the works and allowed by the Lord Treasurer's warrant, the sum of 78*l.*

THE VICTOR EMMANUEL MONUMENT.

THE invitation to the new competition for designs for a national monument to Victor Emmanuel, which was recently issued, with the signatures of Signor Depretis, Minister of the Interior, and the Secretary of the Royal Commission, Signor de Renzis, places no limitation on the nationality of the competitors. With regard to the particular conditions of this contest it is stated that the site of the new monument is to be the northern brow of the Capitoline Hill in place of the old monastery of the *Fratri Minori Osservanti di S. Francesco*, and on the same level as the Church S. Maria in Aracoeli, on a prolongation of the axis of the Corso, the old *Via Flaminia* forming a worthy termination to that road.

The principal conditions to be observed are the following:—

1. The principal feature of the monument is to be an equestrian statue of Victor Emmanuel in bronze.

2. It is to have an architectonic background, consisting either of a portico, a loggia, or other piece of architecture, according to the taste of the artist, and which is to conceal the buildings on the right. As to the dimensions, they may be taken at 30 mètres in breadth by 29 or 24 in height, with a minimum distance from the side façade of the church of 10 mètres.

3. A series of steps are to lead up to the monument from the prolongation of the Corso, the height being 27 mètres.

Competitors have further to observe the following regulations:—

4. The models of the equestrian statue must be 0·8 mètres in height, exclusive of socle.

5. The drawings for the ground-plan are to be 1-200th, and those for the elevation 1-100th of the natural size.

6. The details are to be in one-fortieth of the monument and the chief portions of the architecture.

7. There is to be a description of the work and an estimate of cost handed in. With regard to foundations and substructure, it is notified that a lump sum of one million francs is allowed.

For the entire work, foundations, substructure, erection, sculptures, painting and decorations, the cost is not to exceed 9,000,000 francs or 360,000*l.* Competitors may either give their names and addresses, or may use a motto enclosing their names in sealed envelopes bearing the motto in question.

The competition will close on the 15th of December, 1883, at five o'clock in the afternoon, and the plans and models are not to be sent in before the 15th of November. They will all be publicly exhibited before the award of the judges is made known. The result will be published in the *Gazzetta Ufficiale del Regno*.

The author of the best design and model which shall be chosen for execution will be

charged with the duty of carrying out the architectural part or with the execution of the sculpture, and will be allowed the sum of 50,000 francs. An equal sum is to be divided amongst the next best competitors. The Royal Commission charged with the duty of conducting the competition is the same as was appointed by the royal decrees of 13th September, 1880, and 12th February, 1882.

BITUMENISED BRICKS.

IN a recent issue, the *Deutsche Bauzeitung* called attention to an experiment in street paving at Berlin. Bricks of the dimensions of 8×4×4 inches (in the quality of the usual so-called white spandrel-bricks) have been employed which have been impregnated with asphalte by a patent vacuum process. By this mode of treatment, after the expulsion of air and water has taken place, the bricks absorb from 15 to 20 per cent. of bitumen, and the porous easily destructible substance is changed into a tough elastic mass, said to be capable of resisting pressure and concussion in an exceptional degree, and resisting the ingress of moisture. The bricks are then laid upon a concrete foundation, 6 in. in thickness, by means of hot tar.

The traffic at the point in question has always been heavy, as no less than 1,000 light vehicles per hour are said to cross the spot chosen for the trial, in addition to 1,300 tram-car journeys over this portion of the roadway. No previous system of paving has been found to last beyond three months without showing signs of injury, and the opinion is expressed that this new paving material has the needful resisting properties, as it is rougher than compressed asphalte and harder than wood. Besides these advantages the points of junction are said to afford a firmer foothold for the horses, and there is no absorption of moisture. The importance of the new discovery is also dwelt upon with special reference to the construction of waterproof walls, stable-pavements, counter-walls, &c.

A more recent issue of the *Thonindustrie Zeitung* discusses the matter in a critical spirit, and records the fact that at the point named some of the bricks display, after about three months' wear, such crumbling that they have had to be replaced, which has, however, been done with comparative ease and rapidity. It is remarked that the rather sudden failure of these bricks is the more surprising as they had not previously exhibited signs of wearing away, and doubts are expressed whether the material chosen to be impregnated is really the most suitable for the purpose. An examination by Herr Rühne of specimens of the defective bricks seems to have raised in his mind some doubts as to the efficacy of the process as really increasing their resisting properties. Machine-made bricks had been used, which are, as a rule, wanting in homogeneousness, and although the surface was decidedly strengthened by the process, the middle of some of the bricks had apparently not been impregnated. He does not, however, attach any conclusive importance to these appearances, as some of the crumbled bricks were impregnated throughout. The reason of the sudden wearing away when once the outer surface has been affected is not easy to explain, as frost could not have penetrated the surface, and it is not supposed that it could have rendered the asphalte brittle. Hence it is argued that the want of complete success may be fairly attributed to the kind of brick chosen, and possibly in some degree to some peculiarity in the manner in which the process of impregnation has been carried out. The hope is expressed that further experience will remedy the partial imperfections which have been found to exist in the application of the principle indicated.

A correspondent of the same journal remarks that wall bricks can, by an old method, be impregnated up to 23 per cent. of their original weight, with a mixture of asphalte and tar, and that he fails to see the advantages of the new process. He gives various interesting details in proof of his assertion that the strength of the impregnated brick is dependent upon its qualities before impregnation, and that the process in question cannot remedy such defects as have originally existed in the bricks.

According to the quoted reports of the municipal authorities of Stuttgart, the system of laying down the bricks impregnated according to the older process, between the tramway lines, has proved decidedly successful. An extension of its application is recommended, on the grounds of the durability thus arrived at, as well as the more comfortable track which is obtained, and the contingent economy in the supply of horses for the requirements of the traffic.

NEW OFFICE BUILDINGS AT THE WATERLOO RAILWAY STATION.

THE London and South-Western Railway Company have just erected a large block of new office buildings at their Waterloo Station, in addition to the costly extensions which have for some time past been going forward at the Company's Waterloo terminus. The new offices, which were opened for business on Monday, are situated between the main approach to the station in Waterloo-road and the entrance to the Windsor and Richmond section of the line in York-road, and form a distinct block, with four frontages, the main elevations being respectively to the east and the west. The first-named frontage, approached out of Cross-street from Waterloo-road, is about 120 ft. in length and 60 ft. in depth, and is carried to a height of 60 ft., having a spacious open area or court-yard in front for the marshalling and convenience of the company's luggage and parcel vans. The ground-floor portion of this part of the building consists of a covered carriage-way, with a raised platform beyond, extending the entire length and width of the building, where parcels and luggage are received, and from which they are likewise despatched both inwards and outwards. The superstructure of the building above this depôt,—two lofty stories in height,—rests upon massive iron columns and girders, and the arches supporting the high-level approaches to the station itself. The east frontage is faced with piers and pilasters in moulded cement, each floor having a range of twelve lofty arched windows. The west or high-level frontage of the building, which is on a level with the railway and the adjoining courtyard, is reached by either the Waterloo-road or York-road incline. It is of the same length as the east frontage, faced with stock brick, with red-brick bands and arched window-heads, and Portland cement cornices and ornamentation. The ground-floor (immediately above the depôt already referred to) contains in the centre a spacious parcel and luggage office, 70 ft. by 50 ft., having a large central lift communicating with the depôt below, by which parcels and luggage are lowered for delivery as they arrive at the station. And here it may be observed that in anticipation of the Parcels Post coming into operation, the company, like many other railway companies, have made considerable reductions in their charges. On the north side of the ground-floor is what is designated the "window parcel office," and on the south side the "office for parcels from the country," and the "lost property office." The upper floor contains numerous clerks' offices.

The company's architect designed the buildings, the contractors for which were Messrs. Perry & Co., Tredegar Works, Bow.

NEW SCHOOLS AT ST. ALBANS.

IN the *Builder* for September 16th, 1882 (vol. xliii., p. 380), we gave an account of these schools,—then just taken over by the School Board. We now give two pages of illustrations of the buildings,—stating reasons for doing so elsewhere in this number.* It may be convenient to repeat here a few particulars.

In the Alma-road schools the infants' school is on the lower story and the girls' school over it. The latter is shown on the plan,—the girls' schoolroom being 68 ft. by 19 ft. 9 in., and the class-room 17 ft. by 17 ft. This school is considered by the Education Department to be capable of accommodating 155 children, each of whom has thus an area of 10·7 superficial feet of floor space. The original surface of the site being below the level of the adjacent roads the playgrounds are reached by inclined paths. The upper story is reached from the playgrounds by a stone staircase with easy steps, half-landings, and solid walls between the flights. The contractor was Mr. Christopher Miskin, of Romeland, St. Albans; his foreman on the works being Mr. Henry Hilliard.

The Hatfield-road school for boys has been erected on a site which will probably be closed up a good deal on the east,—the only side on which the buildings now come fairly into view. The architects were, therefore, instructed by the Board to make the buildings very simple in detail. The walls are of grey-coloured bricks, and the roofs covered with red Wisbech plain tiles. The school, as it stands, is considered capable of accommodating 250 children, giving each of them a floor area of 10·9 superficial feet. The entrance, cloak-room, lavatory, &c., have been made larger than immediately necessary, with a view to the school being enlarged hereafter so as to accommodate 350 children. The contractor was Mr. Daniel Ireson, of Waterloo, Northampton; his representative on the works being Mr. F. W. Austen, and the foreman Mr. Samuel Bayes. The arrangements for ventilation comprise Tobin's ventilators in school and class rooms, shown and marked T on the plans, chambers in the roofs above the collar-beams, louvred ventilators in the roofs, &c., and flues in the chimneys with Boyd's flue-plates at the sides of them. The heating throughout is by Shorland's Manchester grates. The latrines have Bowes Scott & Read's patent troughs, and Field's self-acting annular syphons, giving flushes of 100 gallons; they are said to be very satisfactory and effective.

The buildings were designed and superintended by Messrs. John & S. Flint Clarkson, of London and St. Alban's, the architects to the School Board.

* See p. 69.

NEW UNIVERSITY BUILDINGS, LUND, SWEDEN.

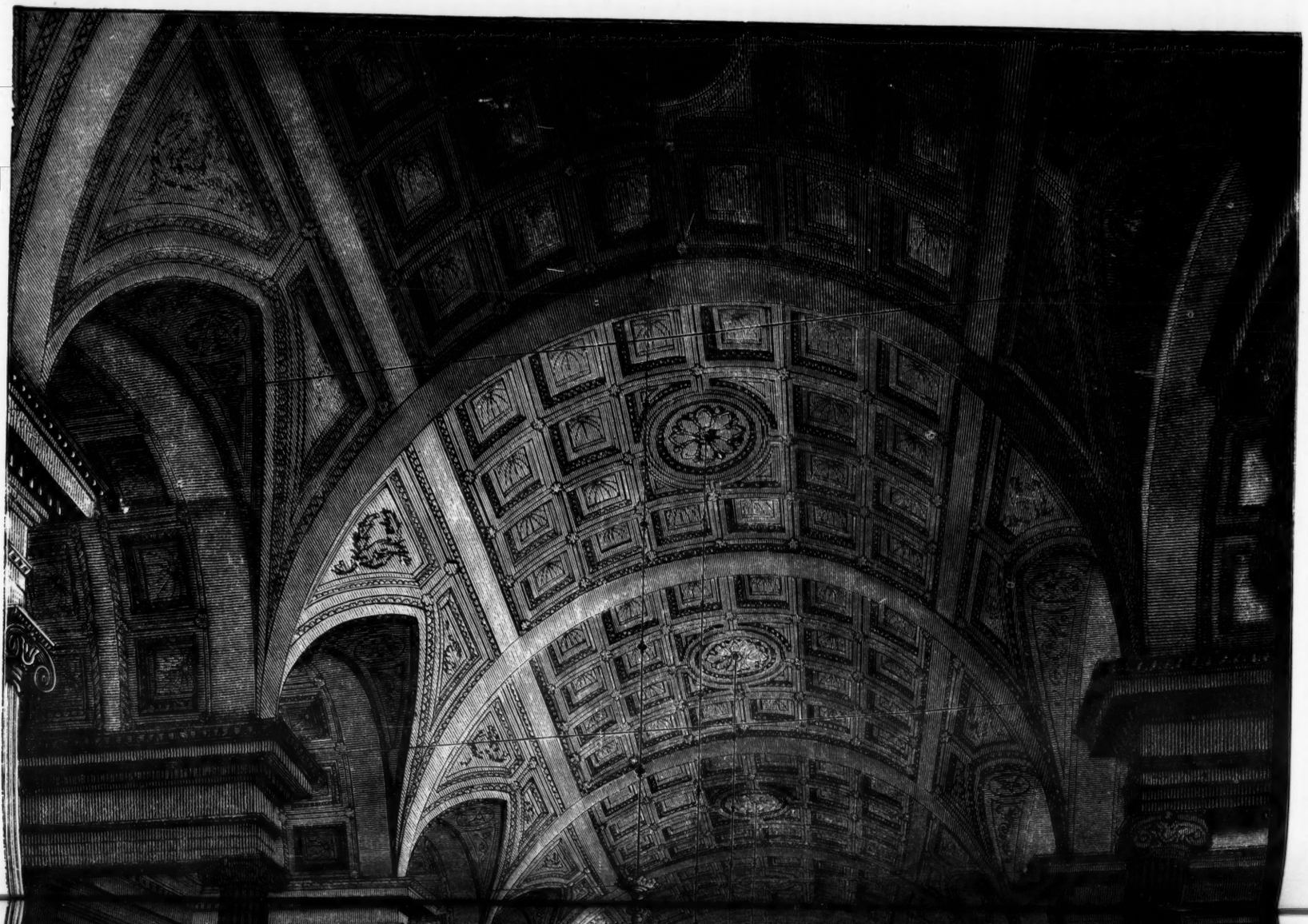
IN our last issue (p. 42), we gave some particulars of Lund University, and an external view of the new buildings recently completed there. We now add, according to promise, an interior view of the great hall of the University, erected from the designs of the architect, Mr. Helgo Zettervall.

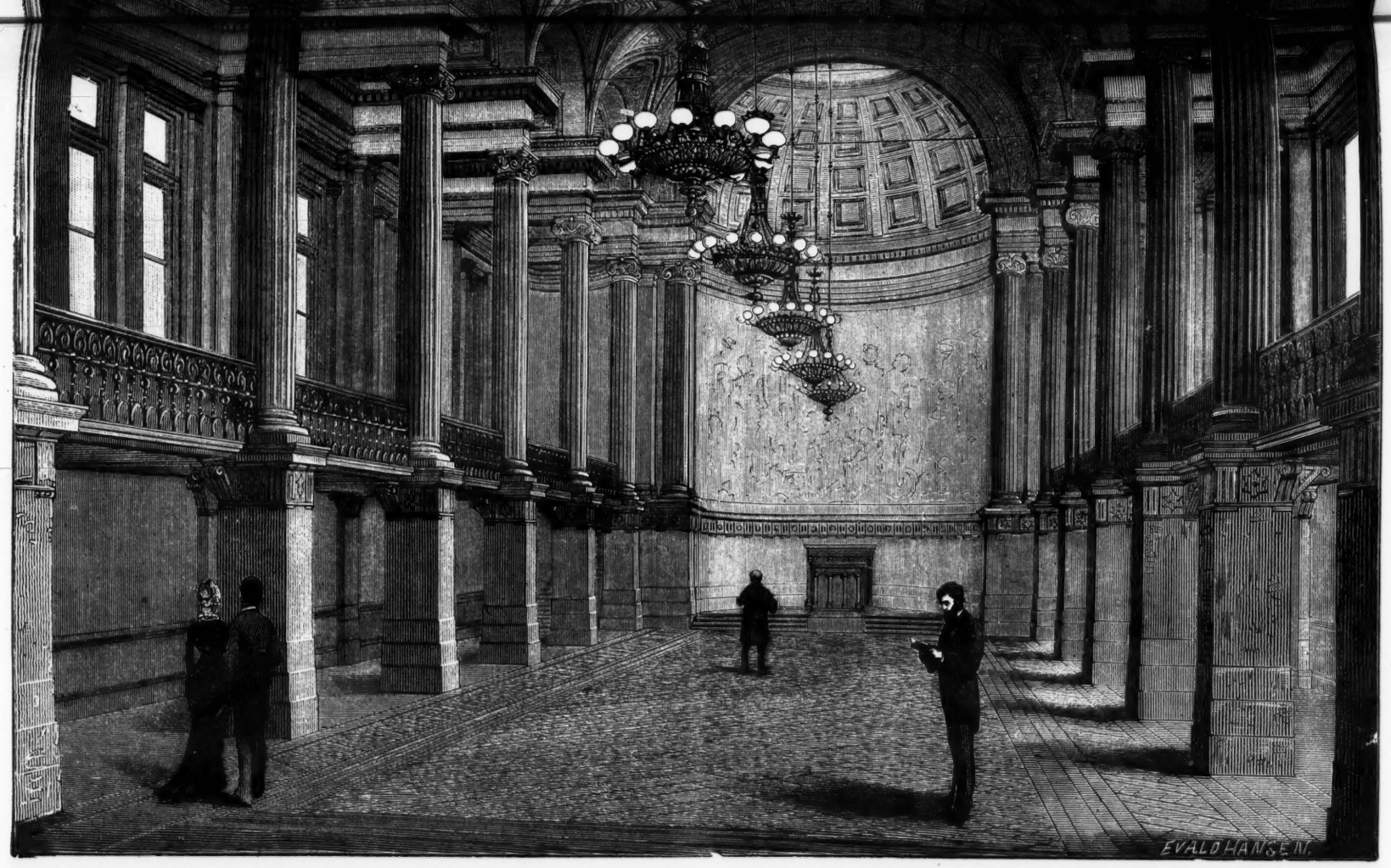
WALL-PAPER DECORATION.

WE illustrate this week one of the many artistic wall-papers exhibited by Messrs. Wm. Woollams & Co. at Manchester, and to which we briefly referred (p. 571, vol. xliii.) in a notice of the Fine Art and Industrial Exhibition now being held there. It is an original composition designed for them by Mr. Owen W. Davis, architect, in the unique style prevailing in this country during the latter part of the last century, known commonly as "Adam's," and is a well-executed specimen of the paper-stainers' art. Printed in vellum-coloured raised flock upon tinted grounds, the filling,—admirably well balanced, by the way,—terra-cotta, the dado blue, the frieze subdued green, with strings and borders in harmony, the special object of the manufacture is to provide a decoration in permanent relief, which, after serving its turn in its original form and colouring, may, when soiled with age, be perennially renewed at small cost by a coat or two of paint. It is a rich, yet delicate composition, in form and colouring a good background for the Sheraton and Chippendale furniture now so much in vogue. It will be seen by the illustration that the decoration, named by the makers the "Grosvenor," is designed to adapt itself to any pitch of staircase, the dado being arranged to accommodate itself to any rake, as well as to rooms and corridors, while two distinct borders are provided for dado rail, the one for horizontal use, the other having a form suitable for employment on the straight, or obliquely at any desired angle.

NORMAL SIZE FOR BRICKS IN SWITZERLAND.

AT the last meeting of the delegates of the Swiss Architects and Engineers' Union, the report and recommendations of a special committee upon the question of a normal size for bricks in Switzerland was considered, and a resolution was adopted recommending the following dimensions for general use:—Length, 250 millimètres; breadth, 120 millimètres; and depth, 60 millimètres. These figures agree in all but one point with those of the normal-sized bricks in North Germany, where the depth or height is only 55 millimètres. This is a very trifling difference, and the bricks of the two countries are, therefore, for practical purposes almost the same.



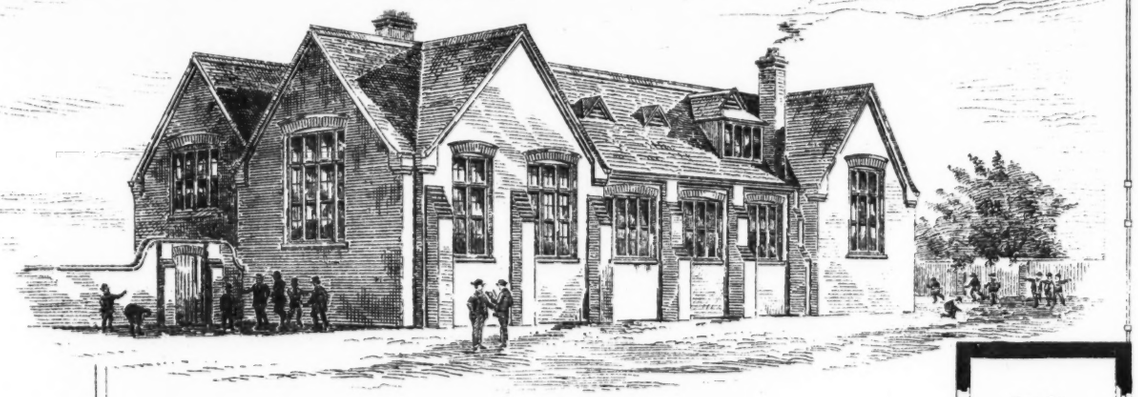


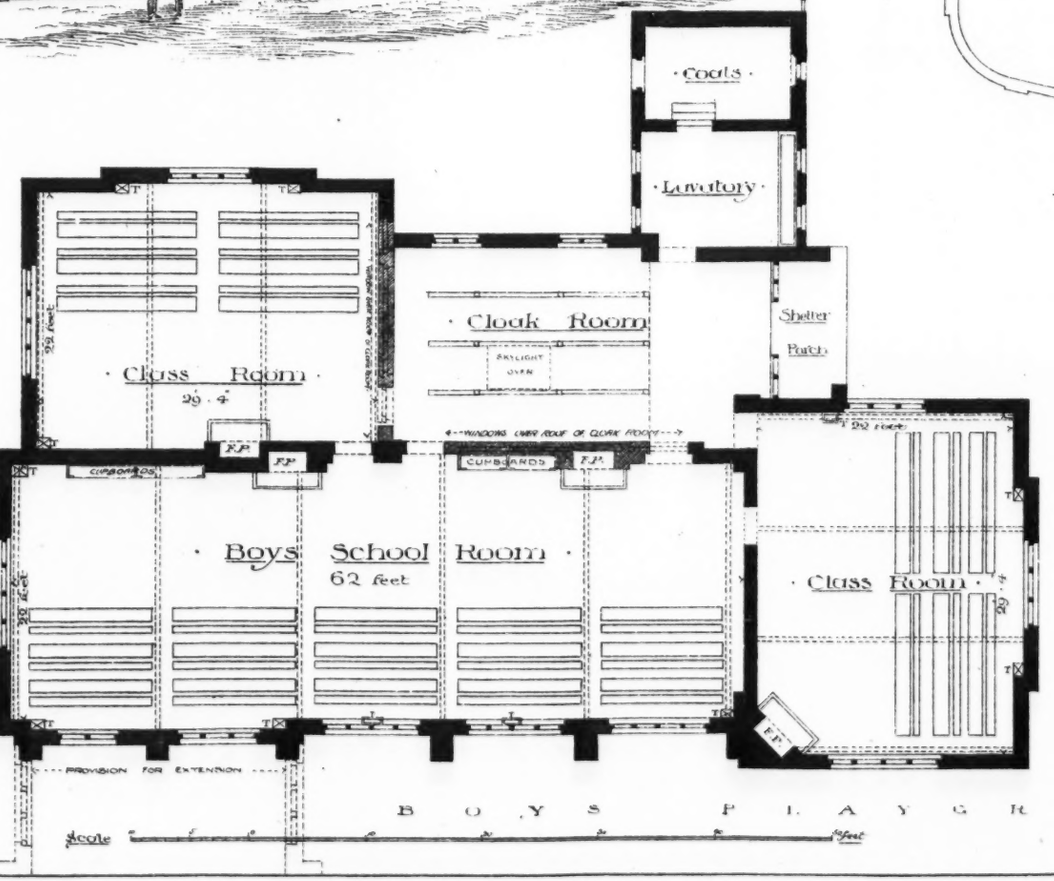
NEW UNIVERSITY BUILDING, LUND, SWEDEN: AULA.

HELGO ZETTERVALL, ARCHITECT.

ST ALBANS SCHOOL BOARD

SCHOOL FOR BOYS, HATFIELD ROAD

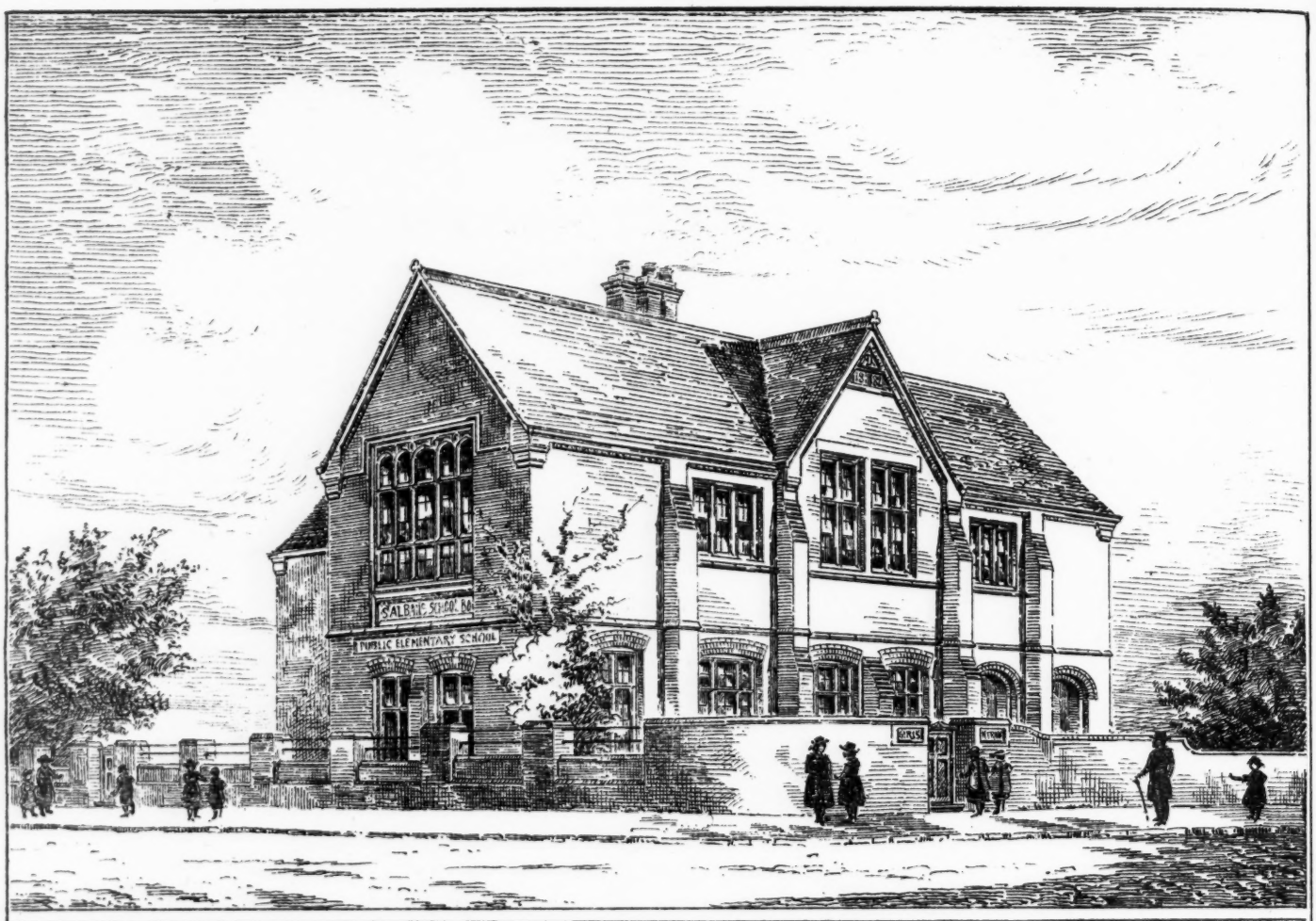




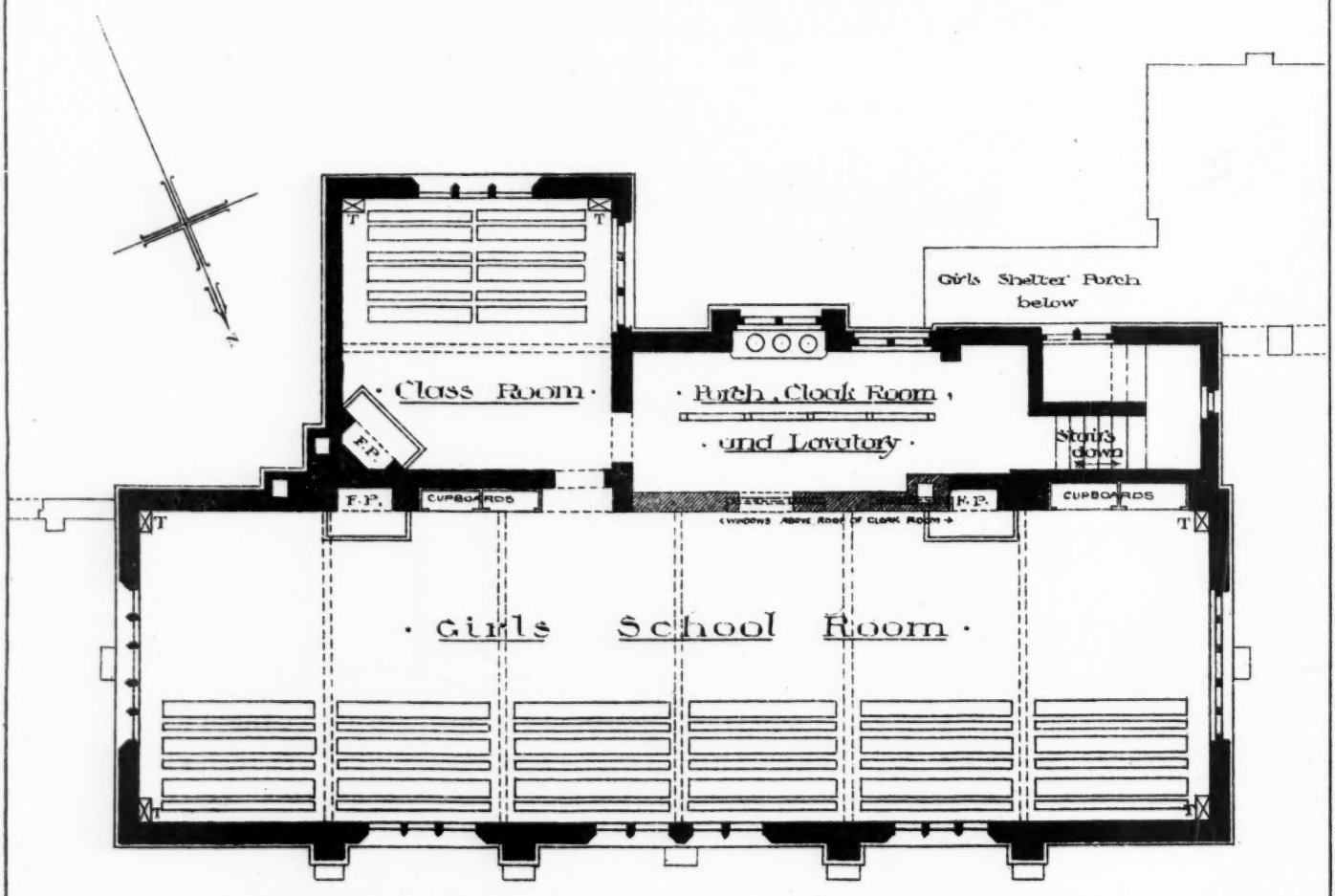
John & S. Flint Clarkson, Architects

Whiteman & Bass, *Photo-Litho* 236, High Holborn

Wyman & Sons, Printers, 74 Queen St



· St. Albans School Board · · Alma Road Schools ·



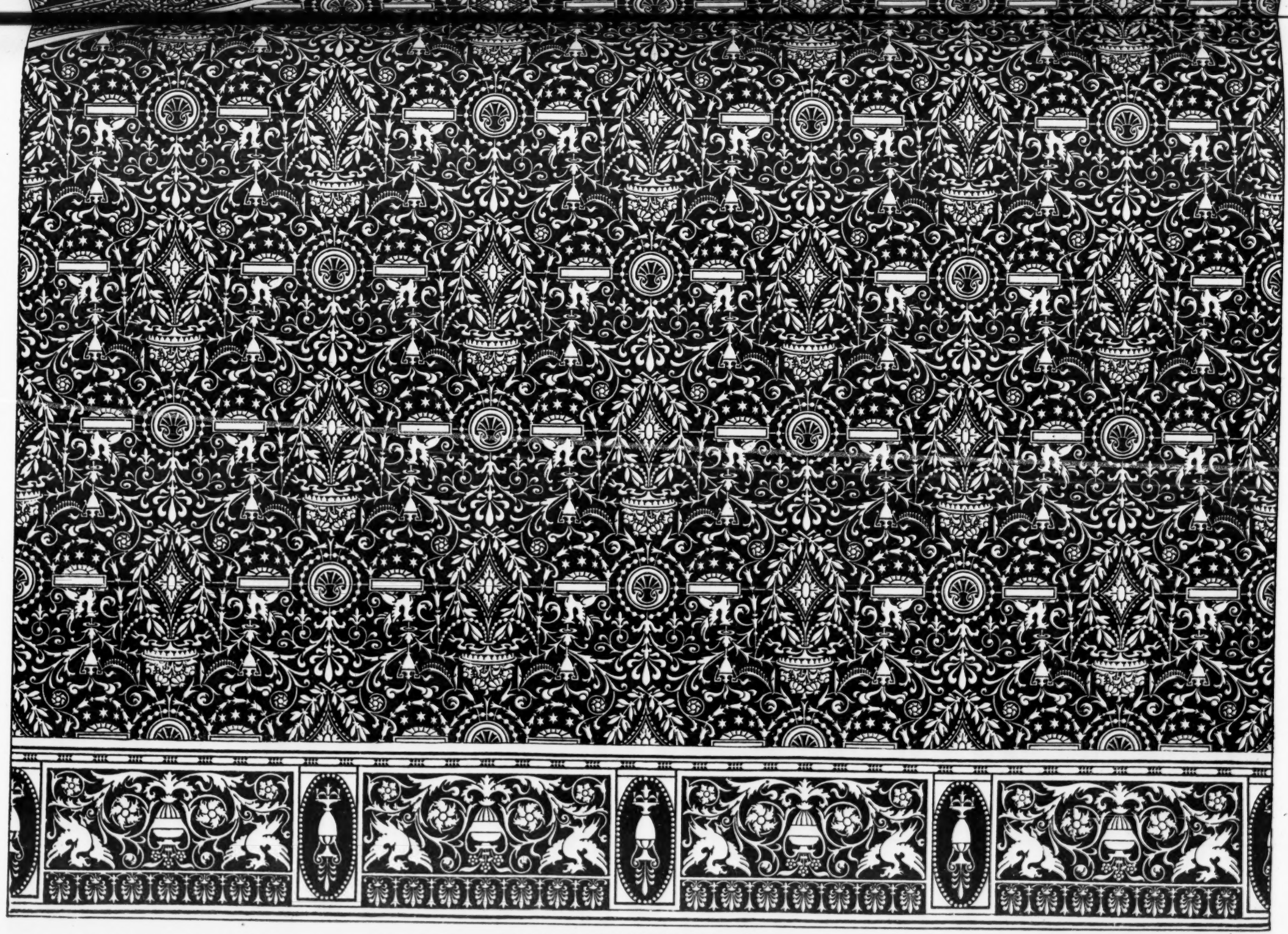
— Plan of the Girls School —

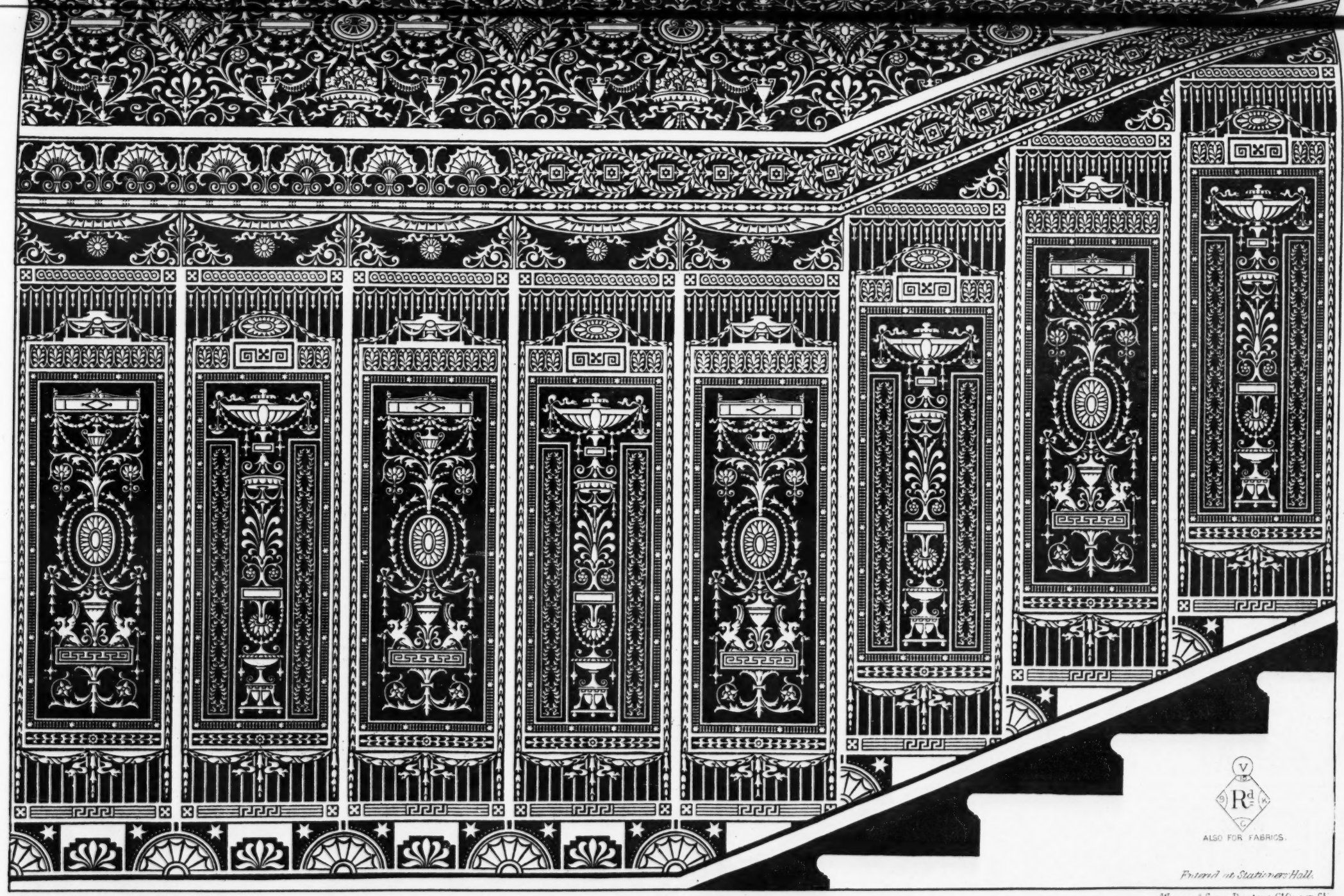
Scale 0 5 10 20 30 40 Feet

John & Stewart Clarkson · Architects ·

Whiteman & Bass, *Photo-Litho* 236, High Holborn

Wyman & Sons, Printers, Gt Queen St





Whiteman & Bass. *Photo-Litho* 236. High Holborn.

Wyman & Sons, Printers, G^t Queen S^t

WALL PAPER DECORATION:- ("THE GROSVENOR") ADAM STYLE.

DESIGNED BY M^R OWEN W. DAVIS, ARCHITECT,

FOR

MESS^RS W^M WOOLLAMS AND C^O

ON THE USE OF BUILDING STONES.*

IN the paper I had the privilege of bringing before the Association last winter,† I pointed out the characteristics of good Building Stones, and the principal quarries in Scotland from which such could be got. I stated that what the architect had to look for was a stone that was *durable*, *strong*, and of a *colour* which would best bring out the architectural features of his design, and harmonise with the locality and surroundings in which it was placed. We have, fortunately, within easy reach, abundance of stone combining these qualities; but, however good or beautiful it may be, if wrongly used disappointment and failure are sure to be the result.

The laws observed in regulating the elements and forces in nature are thoroughly geometric, and the same laws are equally binding on the architect in his works. The constructive lines on which nature proceeds never fail, when free from debasing influences, to secure what we call beautiful in form, colour, or usefulness; and the same lines cannot be too closely followed by the architect or builder who desires to reach excellence in an art which is noble in the highest sense of that word.

I know that it is held by many that the architect or artist is only trammelled in his conceptions by working on geometric lines. Some men, no doubt, have an intuitive perception of what is symmetrical and beautiful, either as to form or colour, just as there are those who, without the aid of gamut or scale, have an inborn knowledge of what is harmonious in music; but I hold that in architecture, as applied to the *true* styles, a geometric basis is at the root of what we admire in the examples we have of these; and that, if a new style of architecture is to be developed, we must fall back on what guided the old designers in their original conceptions of what was not only true to its use, true in construction, true in symmetry, but beautiful as well, because it *was true*—the cube, the circle, and its geometric development, giving that which we admire and call Classic, while the circle and the equilaterial triangle supply the key to those noble Gothic structures which were erected five hundred years ago.

Before I enter upon the consideration of the uses of stone, I wish in a sentence or two to notice the use of timber and iron as constructive materials. There is a true way of using these, just as there is a true way of using other building material, such as stone; but a serious mistake will be made by the architect or engineer if he attempt to use these on the same lines as or for purposes for which, by their nature, they are not at all applicable. As to the first, the designer who understands what timber as a constructive material can do would never think of using it for the purposes of an arch; especially one which has to meet the strain of a vertical and moving load. Yet this has been done on some of our most important railways in the construction of bridges and viaducts. Neither should iron be used for purposes which stone or other material is only fit for. To build a structure on constructive lines which admit of play or movement when the weight and thrust of a railway train or moving force comes against it, or upon it, is certain in time to be fatal. Hence the care that should be taken whether with stone, wood, or iron to adopt a system of construction which will not only meet the nature of such material, but the work it has to do.

The attempt to unite wood and iron where their opposite properties can never harmonise and work together is sure to fall in the long run, as, under a strain or load, timber, from its greater elasticity, will yield to the pressure, but again recover its normal condition after the strain or load is removed. Iron, on the other hand, will keep the set it gets, and if united to the timber, is certain to drag it down to the weakness which is inherent to such a combination of material. What I have said about wood and iron is rather aside to my paper, except in illustration of what I consider so nearly allied to the use of stone, that I trust the Association will overlook the digression. The right use of stone is my subject, and I will endeavour to keep as close to my text as possible, giving in a practical way the results of my own experience, and what I have learned from others. To be in order I will consider:—

1. How to secure a foundation upon which the structure can be safely built.
2. How to place stone in the building so as to secure the greatest strength and durability.
3. How to use stone in the laying of a good foundation.
4. How to use stone in the building of retaining walls.
5. How to use stone in the building of rubble.
6. How to use stone in the superstructure.
7. How to use stone for coursed work.
8. How to use stone for ashlar work.
9. How to dress stone so as to get the most durable surface.

1. *How to secure a Foundation upon which the Structure can be safely built.*—The foundation of a building is of primary importance, as, unless it is secure, the permanency of the structure cannot be maintained, however well built it may be. Before laying a stone, the architect or engineer should be satisfied that the stratum will give equal resistance to the pressure that may be put upon it. Strata that are hard and soft are very dangerous. Even clay, if mixed with boulders (which often happens), cannot be depended upon, unless they are removed, and means taken to equalise the ground on which the buildings are to be erected. Next to rock, no better foundation can be got than sand or gravel when dry. If wet, means should be taken to drain away the water; but if this cannot be done, large flat-bedded foundation-stones, of sufficient area, fairly dressed in beds and joints, and well put together, will, as the load increases, secure a foundation that anything can be built upon. In my own experience I have often tested this, and particularly when building a bridge on a railway contract I had many years ago. This was an under-bridge of considerable span, the girders being in the form of an arch, in segments of cast iron, the security of which depended greatly on the permanent resistance of the abutments, or of the bolts which held these segments together at their joints. In digging for a foundation, it was found that the strata were very soft, being layers of sand and moss alternately, and, to prevent failure, I took the precaution to strengthen the foundation of the first abutment by driving piles to a depth of 30 ft. to 40 ft., with horizontal planking, on which the foundation-stones were bedded. Before building the second abutment, acting on the advice of a railway contractor who had had more experience than myself, I adopted a different plan, viz., to dig out the soft material to such a depth and area as secured an outward resistance to meet the pressure of the large-sized stones that were afterwards put into the foundation, course after course, until the load pressed out the water, and so secured a foundation which was equally strong, if not stronger, than the first.

Where the stratum is unequal or not to be depended upon, I know of nothing better than a good bed of concrete, certainly not less than 3 ft. thick, and no architect should neglect this where there is the slightest doubt as to the sustaining character of the ground. This is always necessary in erections of different heights, and is particularly required in churches and other buildings where the spire, tower, or other elevation bears more heavily on the foundation than the walls which abut upon them. And, in addition to this, and to make sure, I would have extra courses in the foundation of the higher and heavier portions, as in the hurry with which we build now-a-days every precaution is necessary. The same care should be taken with respect to oriel windows or projections which do not go to the full height of the building, and consequently have not the same pressure on the foundation. The walls to which these lighter projections are attached should not only be well founded, but the tie or bond which unites the one wall to the other should be left free on the upper beds, so as to allow for the subsidence of the heavier wall without causing the fractures so often seen where this precaution is not taken.

2. *How to place Stone in the Building so as to secure the greatest Strength and Durability.*—Before saying anything as to the various kinds of work put upon stone, or the modes of building, let me state that, for durability, all stones should be laid on their natural beds, especially such as are highly stratified. All stones, however compact in their nature, have a line of fracture, which the quarryman or hewer can easily detect; and although there are a few stones, such as the Liver Rock of Cragleith, Binnie, and Redhall, which show little lamination, and may be used with the natural face exposed, the use of stone in this way should be the exception, and not the rule. Another consideration in the use of stone for important buildings is that of having it quarried, stored, and seasoned for some time before being hewn and placed in the walls. By these means the natural sap is allowed to evaporate, and the stone tested as to its quality. This would add to the cost, but the money would be well spent if this precaution prevented the wasting of stones from the rains, frosts, or atmospheric influences, which, especially in our cities, soon act on the surface of a newly-quarried stone.

Stone that is quarried the one day and built in the next is in a green state, and unfit for use. It is not in condition,—it is at its weakest; its pores are open and ready to absorb, not only moisture, but the gaseous and disfiguring influences which tend to its destruction. Every hewer knows that, to get a polished surface on a stone that has lain for some time, is very different from what he gets on one green and fresh from the quarry, and this of itself should be sufficient evidence to warrant the precantion I have recommended, which is to thoroughly season the stone before using.

To know what good stone really is, and how it can be best used, the architect who practises in this city, or the student, has not far to go to see, not only the most durable stone, but also variety of masonry, as exemplified in such as Holyrood, Heriot's Hospital, and the residential buildings of the old town, erected centuries ago; or, turning to the modern buildings of the new town, stone of equal durability and variety of masonry, as shown in the polished work of the better-class buildings of the terraces, crescents, and squares, such as Royal-terrace, Randolph-crescent, Moray-place, or Charlotte-square; while in George-square, Gilmore-place, Thistle-street, Rose-street, or Jamaica-street, work of a cheaper kind has been adopted, all which are not only instructive, but interesting, in showing what masons could then do in erecting buildings that have stood the test of time, which makes no mistake in exposing what is good or bad in many things besides the art of building. My next consideration is,—

3. *How to use Stone in Laying a good Foundation.*—In my paper on Building Stones I gave the result of some experiments in testing foundation-stones for the chimney of the Edinburgh Gas Company, and the result of these experiments proved to my mind that as you enlarge the area of the stone a greater proportion of resistance is gained, and that a laminated stone, such as Hailes, would increase in strength according to its surface more in proportion than that of a Liver Rock stone, such as Redhall or Craigleith. I notice this more particularly to show that a soft stone need not be rejected if laminated, of large area, fairly dressed on the beds and joints, and bedded on what I would call a swimming bed of mortar, so that every portion of the surface of the stone would get a fair share of the work it had to do. Foundations should have the courses of sufficient breadth to admit of scarcements on either side, and all round, so that the wall, pier, or pillar resting thereon may have a good footing, and equal resistance through and through to prevent sinking. I have known, from the neglect of this, worse than subsidence happen, owing to the foundation-courses being filled with ordinary rubble in the centre, which, yielding when the pressure came, brought down the building, involving not only loss of life and property, but questions of responsibility that had to be settled in a court of law. The subsidence of the walls of a building occasioned by a bad foundation or inferior work does not show itself all at once,—it takes time to tell whether the foundations have been well or ill laid upon an unyielding strata, badly bedded stones, or a faulty construction; but once it does begin to fracture, the unequal, and what I would call the unfair, strain that is thrown upon other portions soon leads to serious consequences.

4. *How to use Stone in the Building of Retaining Walls.*—The chief object here is to build so as to lean to and resist pressure from behind. To do this satisfactorily the excavations should be dug deep enough to secure the resistance necessary to meet the thrust when it comes; the walls should be built of the largest material that can be got, and bedded at right angles to the batter on the face. Small-sized stones in such a wall are useless. Heavy material, well dressed and bonded together so

* By Mr. Jas. Gowans. Read before the Edinburgh Architectural Association on the 17th inst.
† See *Builder*, vol. xli., p. 673.

that when the pressure comes,—in most cases suddenly,—every stone will be ready to take its fair share in preventing an overthrow,—that is what is wanted, not small-sized material, which has no time to bond and get that unity of resistance which such a structure requires.

5. *How to use Stone in the Building of Rubble.*—Of walls built of rubble there is a great variety. Common rubble masonry or walls built with stones of irregular shape as they come from the quarries, if well put together, well dressed, well knocked to their bed, and built from front to back, so as to bond and get them to work together, enduring walls may be built; but if, on the other hand, as is too often the practice, such work is done by running up one side of the wall before the other, without bond or ties, such as are required to unite the whole, then nothing but failure can be the result. There is another kind of rubble, of which we have some admirable examples in the city,—that is, coursed rubble. This work was done entirely with the pieced hammer, without chisel mark of any kind, and when well bonded and backed, walls of the most enduring kind were got. Where what is called squared rubble is adopted, with ordinary rubble for backing, the practice of running up the outer face should not be allowed. No worse masonry could be built than this, and it is to be regretted that so much of this kind of work is being done in our city. It is not only bad in itself, but leads to our younger masons being trained to a most objectionable style. Speculation in building, where cost appears to be the first consideration, has led to much of this kind of work, although I am by no means sure but what there is something else to be blamed, and that is, that many of our masons have not been properly trained owing greatly to their being allowed to break their indentures, and not serving their full time of apprenticeship. Masons were better trained when it was more the custom than it is now of indenturing apprentices for a term of years, usually five. Three were devoted to the art of hewing, and two to the art of building. When the term expired it was usual for the master to attach a certificate to the indenture stating how good an apprentice he had been, and his qualification to take his place as journeyman; and he was proud of the document as showing what he was and what he could do. This was a good custom, and one which I should like to see revived by the masters or workmen's unions, whose interest it should be to have well-trained men in their ranks.

In specifying rubble work architects should be careful in making clear the kind of work they require, as many questions have had to be settled in court, which might have been avoided if more clearly described, or if, what is better still than any specification, the kind of work was shown to contractors before estimation. There are so many different kinds of rubble, such as common, squared, random, hammer-dressed, nidged, and pick-dressed rubble, and rubble where the stones are limited in length, height, and breadth of bed, which comes to be a puzzle to the mason, if specified for walls such as I have seen built in this city. These should be made perfectly clear by the architect by *sample*, so as to prevent after-disputes, and show exactly how the stone is to be treated.

Another kind of rubble which was much in vogue when the houses in Moray-place, &c., were built, as shown in the back walls of the same, and also in the front of the older houses in George-square and Gilmore-place, was that of *coursed* rubble. As the term indicates, the stone was taken from the rubble, squared and faced entirely with the cairn hammer I have before alluded to, and it is well to notice from these examples how shapely and well done the work is,—some of it brought to a surface by squaring the stone so as to show the natural face, and others by using the piend for dressing off any inequalities, and bringing it more within the term of what we call "*nidged*' work, only with much less labour than that required for this more costly style of masonry.

How to use Stones in the Superstructure.—There are many ways of building, but whatever kind of work is adopted, whether ordinary rubble stone, cubic stone, or ashlar, the great secret is to make every stone do its fair share. The true way of doing this is to build the walls from front to back of stone, as nearly equal in thickness as possible,—that is of stones of cubic dimensions, or stones of a large area, examples of which we have in the remains of Egyptian and Cyclopean masonry. This is particularly desirable in the space between the foundation courses, and where the face of the wall comes to be seen good masonry is required for this, although it is often otherwise, owing, perhaps, to its being buried and out of sight. For the abutments of bridges or piers of viaducts, cubic stone only can be used with safety. Where a great load has to be carried, to build with cubic stone facing and rubble stone backing, is a mistake, unless the rubble stone is of large size, and carefully bedded. With cubic stone and ordinary rubble you have in the outer face of the wall fewer beds and less mortar than in the backing, so that when the strain comes there is fracture, or a tendency for the wall to yield to the weaker side. Walls, as a rule, are much too thin, to allow of the interior of a building being kept at a desirable temperature,—thick walls are necessary. I would have all outer walls of not less than 2 ft. 6 in., and, as applied to chimney heads, you will never have a good draught in chimneys that are thin after passing through the roof. Unless they are thick, the current gets chilled and choked, owing to the cold damp air it meets with from the thinness of the masonry; and, further, it leads to disfigurement, by the use of cans, cowls, and such like contrivances, of what the architect should make one of the most telling features.

7. *How to use Stone for Coursed Work.*—The variety of this work lies more in the mode of *dressing* than of *building*. There are, for instance, *hammer-dressed* and *nidged* coursing, both done with the hammer, the difference between which has led to many disputes. Specimens of ordinary hammer-dressed coursing may be seen on the back walls of the older buildings of the New Town, while in many of the same where modern additions have been made, nidged coursers have been used, both as different as to cost as that of ashlar and ordinary rubble work. There is also *pick-dabbed* coursing, which requires to be clearly defined, as without a specimen it may be interpreted to mean work done with the ordinary pick, which belongs to the builder; or it may mean work which can only be done by the point or pick dabber of the hewer. But before leaving this part of my subject, I do not know that anything more valuable could be done through your Association than to have a clear and well-considered specification prepared, treating of *all* kinds of work. This would be certain to lessen, at least, the differences so often arising between architects and builders as to what is meant.

8. *How to build with Ashlar-facing and Rubble Backing.*—For ordinary purposes where there is no great load to carry, to build a substantial wall, the ashlar should be well squared on the beds and joints, and laid in a good swimming bed of lime, not stones with slack beds, which the builder has to pin up to bring to the plumb, but square, well-hewn beds which will bear equally on the mortar and stones below. The builder has no excuse for not bedding them well, as with the machinery now in use, such as steam cranes and such like appliances, he never needs to put his hand to the stone, but can at once have it lifted and rebedded without the slightest effort or trouble on his part. A great mistake is often made in laying ashlar with too thin a bed of lime, and also jointing too closely. This may look well, but hard to hard is bad masonry, as when the pressure does come a fracture from the face is sure to follow; and I have observed buildings where the architect or clerk of works was anxious to show thin beds and close joints sadly defaced although otherwise well built, and that with the hardest of material. All ashlar work after being backed up should have the joints well grouted with thin lime, this especially in walls that are much exposed to rain and in such a climate as ours. The backing of ashlar, or hewn work of any kind, should be of large-sized rubble,—every stone being well knocked to its bed, not simply tapped with the light hammer now in use or the edge of the trowel, but with the old-fashioned cairn hammer which every good builder had beside him on the scaffold fifty years ago.

I cannot help noticing here how different the tools which builders now use are from what they were in the time I have referred to. Then they had a large-sized trowel with which they did not spare the mortar, and the large hammer which was freely used and never failed to bring the stone to its bed. Another tool was the hawk-hammer, with one end of which the stone was squared and the other the inequalities were dressed off. The mash and pincher, first used by the hewer forty years ago, were handy tools for bending the checks of rybats, and removing the rough along the edges of the stone. Now these, with the clourer, are part of the builder's kit, and are used by him for doing that which the older hands accomplished with the hammer,—work that was not only cheaper done, but far more tradesmanlike in appearance. Now it is a small trowel, and the lightest of hammers, which, if used, scarcely affects the stone at all. In short, the ordinary rubble building of the present day is not such as will maintain the character our Scottish masons had when I first remember.

9. *How to Dress Stones so as to get the most Durable Surface.*—Of the various kinds of work adopted, and of which we have admirable examples in this city, I am of opinion that polished work is the best not only for securing durability to the stone, but also for bringing out the beauty of its texture and colour. Hammer-dressed, nidged, pick-dabbed, broached, scabbled, droved, and tooled work,—all tend to bruise the surface of the stone and thus expose it to the atmosphere, while the rubbing necessary for polishing removes the bruised material, and presents to wasting agents a surface more likely to prevent decay than any other kind of work I know of.

I have endeavoured to make this paper as practical as possible. Its consideration may be of some value to the architectural student, as it is a matter of regret that buildings on which the architect rests his reputation, and to which his genius has been applied, should perish either from faulty stone or bad masonry. Five hundred years ago, when those beautiful examples of Gothic architecture were erected, with their traceried windows and vaulted roofs, the architect and builder seem to have gone hand in hand not only in planning, but in building up, on true constructive principles, edifices which have withstood the ravages of time for so long a period.

Before closing, I wish to allude to a custom which prevailed when such buildings as Heriot's Hospital were erected. Then every hewer indented his mark on the face of the stone he had hewn, and it may be of interest to visit this building and observe how carefully this was adhered to. You can by these means nearly ascertain how many hewers were employed on the work, how the structure was built up round and round, and how those most expert in their craft had allotted to them the stones to dress which required the greatest skill. I have seen the same marks on buildings I have examined all over the country. I had a hobby for collecting these some years ago, and visited many of the principal cathedrals and buildings in England. I made a large collection, but unfortunately have lost the record. But it is a custom I should like to see revived, as, in my opinion, it would not deface the stone if done with the delicate and enduring touch which these old masons gave to work to which, no doubt, they attached a high value. Mark masonry, as one of the degrees of Freemasonry, had very likely something to do with the custom, but, although a Freemason myself, my paper precludes me following this phase of the craft further than to mention it as something that is, at any rate, suggestive.

With these examples before us, the appliances we have, and the teaching which every architectural student or working mason can get, we should be able to cope with those who have preceded us. I believe in the earnestness of the architectural student of the present day, but I am not so sure about the technical teaching or training the apprentice mason seeks after. When I first remember there were in the city many drawing-classes, chiefly attended by young men who were either masons, carpenters, engineers, or mechanics of a like kind. There were Ruthven, on the Bridges; Milne, St. James-square; Moffatt, George-street; Paterson, Stockbridge; and others, all teaching drawing, and making good incomes from the crowded classes that attended them. Now we have such institutions as the School of Art to take their place; but I question very much if the classes are as well attended there as the others were in the time I have referred to. Besides this, there was at every important building a drawing-class, usually conducted by the chief foreman or clerk of works, which had the effect of theoretically educating the workman to a proficiency he could not otherwise have attained. In every squad there were numbers of men who were fit, from their in-

telligence and training, to act as clerks of works, or foremen; and, in mentioning the former, I am of opinion that the well-trained mason is better for such a trust than the joiner.

No mason or joiner can be perfect in his trade, or have his heart in it without a knowledge of drawing. As to masonry, I know of no trade that affords greater scope to the studious mind. To be proficient, his head and his hands must work together. There is endless variety in the operations he has to perform, and it is far removed from work that is nearly, if not altogether, mechanical. I trust that as education (especially technical) advances, we may have a race of masons who will be something beyond mere machines, and who, by their training will help in no small degree our architects to carry out buildings whose architecture will be worth copying even by generations to follow us.

PORTLAND CEMENT:

ITS MANUFACTURE AND USES.*

Tensile Test.—All cement used in this country is tested for tensile strength before it leaves the works, sample briquettes being made from each day's grinding, and also from each shipment, collected as above described, either by handfuls from the spouts, or by small quantities from each sack. It has been until lately the practice to give the briquettes a sectional area of 1½ in. by 1½ in., equal to 2¼ in., but they are very generally nowadays with 1-in. section. The form of the briquettes considerably influences the results obtained, and the manipulation of them further affects the tests. Indeed, there are many men who are never able to obtain satisfactory results, and two individuals using the same cement, the same moulds, and the same testing machine, will differ by 100 lb. per inch of section in the tensile strain of the samples they manipulate. A fixed quantity of water should be used for each gauging, and there should be just sufficient to work the quantity of cement to be mixed into a fat paste, which is then placed in the mould and allowed to set. It is the practice to shake the moulds, which are laid on pieces of slate or glass, in order to get rid of air bubbles; but there is little doubt that this also affects the result, as the particles of cement, not having the same specific gravity throughout, the coarser and heavier portions fall towards the bottom of the mould, and the tensile strength will not be the same throughout the section, and there will be a tendency towards fracture, commencing on one side before the other, and the result will be below the average strength of the cement. On the other hand, if the air bubbles are not removed, there will be a loss of section equal to their collective area, and the result obtained will also be below the strength of the cement. It is my own practice to work the cement to some extent in the moulds, and to shake them a little. . . . .

Breaking Briquettes. — When the briquettes are set sufficiently to enable them to be removed from the moulds, they are placed in water, and remain there for six days, when they are broken in a testing machine, and the resulting strains are recorded in a book kept for the purpose, and in which also the tests for carbonate of lime, and the days on which each kiln is loaded and drawn are also entered, so that the test for carbonate of lime, for the slurry with which any kiln is loaded may be known, and also the tensile strength of the cement produced from that kiln. This is the practice I follow myself, and, though I am bound to confess that it cannot be carried out thoroughly on account of the quantity of clinker which must, sometimes, be put in the clinker store, and which cannot be referred to any particular kiln, yet, as in the case of the test for carbonate of lime, and the weighing of the chalk and clay, it is a guide.

Testing Machines.—There are many machines in general use for testing briquettes, those best known being DeMichele's, Adie's, and Michaeli's. I use De Michele's machine; it is simple, strong, and steady, and there is every reason why the result obtained should be accurate, it being impossible to strain the briquette before the testing commences; and this is not the case with Adie's machine, as the briquettes have to be screwed up against the lever, and if this be done carelessly the briquette may be damaged before the weight is applied. In Michaeli's machine the load is applied very steadily and gradually, as this is done by filling the vessel with water, but the double system of levers tends to inaccuracy.

Requirements in Germany. — In Germany there is a standard specification for cement: the test for grinding is that there shall not be a residue of more than 20 per cent. after the cement has been passed through a sieve having 76·2 meshes per lineal inch. For the tensile test the cement is mixed with three times its weight of standard sand, and is tested after twenty-eight days, when it must bear 142 lb. per square inch of section.

Twenty-eight days' Test.—There are considerable objections to this specification; it is impossible to produce a standard sand which shall be always the same, and any variation will affect the testing of the cement. No doubt twenty-eight days' tests are of great value, and it would be a good thing if they could be obtained without inconvenience, but such tests cannot be made by the manufacturer at his works; if they were necessary, a full month's stock would always have to be kept in hand, besides accumulations, and the storage room required would be enormous, and most expensive.

Specifications.—In this country, unfortunately, there is no standard specification, and each engineer specifies in accordance with his own ideas; and the result is, that the manufacturer may have several confiicting specifications to meet at the same time; and not only this, but specifications are often conflicting in themselves. The specification of Mr. Bernays, engineer to the Chatham Extension Works, is as follows:—

The cement must be of uniform good quality, finely ground, and weighing not less than 112 lb. to the imperial (striked) bushel. All cement that does not bear, without breaking, a weight of 650 lb. upon the test blocks, of 1½ in. by 1½ in. section will be rejected. The specification of Mr. Grant, engineer to the Metropolitan Board of Works, is, put in the shortest form. The cement shall be ground so fine that the residue on a sieve of 5,806 meshes to the square inch shall not be more than 10 per cent. by weight. The cement is to be gauged with three times its weight of dry sand, which has passed through a sieve of 400, and been retained in one of 900 meshes per square inch. All cement that when neat sets in less than two hours, must bear without breaking a weight of 142 lb. per square inch, and, if it take from two to five hours to set when gauged neat, it shall bear a weight of 170 lb. per square inch twenty-eight days after gauging. As written, there are no means of comparison between these specifications, as the tests in one case are made at seven days, and in the other at twenty-eight days, and in the first case neat cement is used, and in the second a mixture of sand and cement; but reduced to equal terms the requirements would be somewhat as follows:—Grinding.—Mr. Bernays requires a maximum residue of 20 per cent, after passing through a sieve of 2,500 meshes per square inch. Mr. Grant requires that the residue, after passing through a sieve of 5,806 meshes the square inch, shall not be more than 10 per cent. Tensile Test.—Mr. Bernays requires that the briquettes shall not break at seven days with a weight of 288 lb. per square inch; Mr. Grant rejects any cement which breaks with a weight of 400 lb. per square inch.

One engineer will specify that the cement is to weigh 109 lb. per striked bushel; another requires that it shall weigh 116 lb., and at the same time be quick setting, and have a tensile strength at three days of 150 lbs.; at seven days of 400 lb., and at twenty-eight days of 500 lb. per square inch. This is contradictory: cement which weighs 116 lb. per striked bushel must be heavily burnt, and heavily burnt cement, as a rule, means that it is slow-setting cement. Slow-setting cement will not give a tensile strength of 150 lb. per square inch, at three days, unless it is very highly limed, and in this case, though it may give the required strength of 400 lb. per square inch, at seven days, it is not likely to have a strength of 500 lb. per square inch at twenty-eight days.

Fine Grinding.—The question of fine grinding is a much-vexed one, and the tendency is for engineers to specify that cement shall be ground more finely than was formerly required. It is certain that the cement which will not pass through the meshes of a sieve with fifty wires per lineal inch has little or no cementitious value by itself; but I do not think that it is at all proved that it has no value when mixed with finer ground particles; on the other hand, the coarser particles of cement are generally those which are best burnt, and would, therefore, if reground, make the best cement; and the very fine particles are, as a rule, weak in cohesion. It seems that finely-sifted cement has less strength than that which is unsifted, when gauged neat, but that the reverse is the case when a mixture of three parts of sand with one of cement is used; such a mixture, however, is not one which is much employed in practice. The question arises: is the forty per cent. additional strength, which Mr. Grant claims for cement ground to the German specifications, or somewhat finer, maintained in ordinary concrete, as generally used. If it is, then, by all means, let us have finely-ground cement, but let its use be universal, not occasional; in fact, let there be a specification drawn up which shall meet the views both of engineers and manufacturers, and let it be used for all cement. This question of fine grinding must be reduced, like a great many other things, to the standard of money. Is it cheaper, with the same efficiency, to use cement of ordinary quality, at the market price, or to pay a higher price for very finely-ground cement. In cases where the carriage is not heavy, and supposing the loss in the coarser cement to be due to the percentage of coarser particles, and that these have no cementitious value when mixed with the finer cement, which, however is, I think, not yet proved, then the balance is slightly in favour of the ordinary cement of commerce. But, supposing Mr. Grant's estimate of the value of finely-ground cement is correct for concretes, which I also do not think is proved; and when the carriage is heavy, finely-ground cement will be cheaper, at a considerably advanced price, than that which is more coarsely ground. My own feeling is that cement might be much more finely ground than it is at present, at slight cost; but when such fine grinding as that specified by Mr. Grant is required special machinery becomes necessary, and the cement must be handled twice, and the cost of manufacture is greatly increased. Notwithstanding the arguments of Mr. Grant, and others, and the practice in Germany, I do not think that the case, except when carriage is a heavy item, for or against fine grinding is proved; there is also another point to be considered in cases, as at the Chatham extension works,—where the concrete is made in the proportion of twelve to one,—would there be sufficient of the finely-ground cement, when used in the proportion of twenty to one (which would be the mixture required to give the same strength, if the finely-ground cement has forty per cent. more value than that which is coarsely ground) to fill up the interstices? If there is not, then the whole argument in favour of finely-ground cement, when used for concrete of this quality,—and a very large quantity of cement is used in this way,—falls to the ground.

Cooling.—All cement should be kept at least a fortnight before it is used, and during this time it should be spread out on a dry floor to a depth of not more than 3 ft., and as much less as possible, and turned over at least twice, so that it may be thoroughly cooled, and any free lime which may be present may be slacked. The desire evinced by many engineers for high tensile tests involves the danger of the presence of free lime; where this exists the ultimate disintegration of the work constructed with it is more than probable, for a high tensile strength at seven days, which often means the presence of an excess of lime, does not by any means guarantee that the strength at twenty-eight days will be, as Mr. Faija says it should be, 25 per cent. higher than it was at seven days; rather the reverse. A sample of cement, which broke at seven days after gauging at 300 lb., will often, after the lapse of a year, have a strength of 700 lb. per square inch, while the sample which broke at 450 lb. at seven days will, at the end of the year, give no higher test, and at the end of three years will probably have begun to disintegrate. Cement made with a large proportion of lime, and lightly burned, is most dangerous. Heavily-burned cement is hard to grind, it is generally slow setting, and it gives a low tensile strength at short periods, and gradually increases in strength for an indefinite time. I submit the following specification for your consideration, it will not meet all requirements, no standard specification will do that; but if some standard specification could be agreed on it would be a benefit alike to engineers

* A paper read before the Civil and Mechanical Engineers' Society, Dec. 21, 1882, by Reginald E. Middleton, A.-M.I.C.E. See p. 36, *ante*.

and manufacturers; you may imagine how it must hamper the latter to have to meet the requirements of half a dozen entirely different and conflicting specifications at the same time, each necessitating a different mixture of chalk and clay, a different rate of burning, and a different fineness in grinding.

Proposed Standard Specification. — The weight per bushel, after cooling, to be not less than 112 lb. and not more than 118 lb. per striked bushel, the measure 6 in. deep, the angle of inclination 45 per cent., and the length of the board 2 ft., and the fall from the board to the top of the measure 6 in., the cement being fed from a flat plane at the level of the top of the board into the board.

The tensile strength of the test briquettes seven days after gauging and six days after immersion in water to be not less than 335 lb., and at fourteen days not less than 385 lb. per square inch.

All the briquettes to be of the form shown at No. 4, and one standard machine to be used for testing. The cement to be ground to such a fineness that, on sifting through a sieve, having fifty meshes per lineal inch, the residue shall not be more than 10 per cent.

Analysis.—The following is an analysis of finished cement, taken from Mr. H. Reid's work on the subject:—

Silica	22·74	Alkalies	0·63
Alumina	7·74	Sulphate of lime	1·66
Oxide of iron	3·70	Carbonic acid	3·50
Lime	56·68	Undissolved residue	0·53
Magnesium	0·57	Water	1·90

Remarks.—Portland cement is much more easily made in winter than in summer. In hot weather the cement made in exactly the same proportions, and burnt to just the same extent as at other times, will set so rapidly that it can scarcely be handled, and it is also very apt to crack. This arises presumably from the difficulty of getting rid of the mechanical heat in the cement. It is perfectly true that the manufacture and use of cement has made rapid strides of late years; but there is more yet to be done, both in the direction of improvement in regularity, and in reduction in prime cost. Cement manufacturers are generally troubled with bad water, and this is a fruitful cause of expense. Fuel is a large item, and this might, I think, be reduced; and labour, again, is a heavy charge, and in many cases machinery could do the work better and more cheaply, as for instance, in distributing the cement and shipping it; and last, but not least, means should be found for more efficiently crushing the clinker before it goes to the mill-stones, and for grinding it after it has got there. All these things are matters of detail, only to be arrived at tentatively and after careful observation.

Uses of Cement.—The uses to which Portland cement may be put are various, but it is most extensively employed in the manufacture of concretes, and in this form it serves for the construction of dock walls, retaining walls, foundations, piers and jetties, sea walls, bridges, floors of bridges, and of houses, warehouses, dwelling-houses, sewers, sewer-pipes, flags, tiles, baths, bricks, mantelpieces, mouldings, and ornamental work generally. The Chatham extension works are built almost entirely of concrete in the proportion of 12 of the aggregate to 1 of cement, mixed and laid *in situ*, with a facing of concrete made in the proportion of 6 to 1. The Albert Dock is made almost entirely of concrete laid *in situ*. Dover and Tyne piers and others are made with blocks of concrete. The roadways of a large proportion of our streets are laid on a foundation of concrete, many of our sewers are made entirely of concrete, and sewer-pipes, which are far stronger and more watertight than those constructed of stoneware or fire-clay, are made of the same material, which is also used where fireproof floors are wanted. Foundations are almost invariably made of concrete, which adapts itself to irregularities of surface. Concrete bricks made of breeze and cement in the proportion of 6 of the former to 1 of the latter, and pressed in an hydraulic press, can be made in the morning and built into the work in the evening, and this about the same price as stock bricks, and they can be turned out in almost any weather. Houses may be built of concrete laid *in situ*, and they have the advantage of being almost entirely vermin proof, but they have also the disadvantage that they are very hard to pull to pieces and alter. Concrete may be made into slabs and polished, or it may be used for ornamental mouldings and cast like metal or clay; and it is exceedingly well adapted for such work, for it takes a very sharp impression, as may be seen by any one who looks at the face of a concrete retaining wall, where the grain of the timber used in building will be found exactly reproduced in the cement. Any desired colour may easily be given to the concrete through the medium of the aggregate. Concrete is particularly well adapted for engine and machine foundations, the engine or machine may be blocked up to its proper position and the concrete cast under it until every cranny is filled and the bolts are set perfectly solid in the mass. Concrete slabs are used for paving footways, and offer a much more even and enduring surface than York flags, that is if they are properly made; and this proviso holds good for all concrete works; it must be properly made, care must be taken that the cement is of good quality and not liable to blow, that it is to say, that it does not contain free lime, that it is properly slacked, and that it is not used in the manufacture of concrete after it has once set, unless it is reburnt and reground. Failures in concrete walls are common, not because the concrete is faulty, though it will not adapt itself to circumstances as a brick wall will, and any settlement will cause cracking, and these cracks cannot be easily mended, but because sufficient care is not taken to make the foundations secure, and the wall is carried up to its full height in short lengths, whereas the building should be constructed to as great a length as possible at once, but only to a height of 1 ft. 6 in. or 2 ft., and when the next layer of concrete is laid the surface of the last layer should be cleaned and damped, and if it has been standing for a long time it should be dusted with neat cement. Concrete should be made as required; if it is allowed to set before being put into the work it is useless, and setting begins very early; some light burned cements, when gauged neat, will begin to set within forty seconds of the time when the water is added, and all cements set quicker in hot weather than when it is cold. The more the cement is agitated, the longer time will it be before it sets, and concrete takes longer to set than neat cement, otherwise it would be almost impossible to handle it.

Stucco.—Portland cement is largely used for stucco, and it often fails and flakes off; this again is caused either by the cement not having been sufficiently cooled by natural heat, or by the surface of the wall not having been properly damped, causing the pervious bricks or stone to absorb the moisture required by the cement. Improper materials are frequently mixed with cement; when sand and gravel are used, they should be clean and sharp. Loam or anything of that nature kills cement.

Proportions.—The proportions to be used in the manufacture of concrete must depend entirely on the work to be done, and on the nature of the materials which can be obtained to form an aggregate. We have seen that a proportion of 12 to 1 gives a good result when large masses are used, as in the case of foundations, dock-walls, piers, and jetties built *in situ*; but the sand and stone, or whatever the aggregate is formed of, must be sharp and strong; if soft and porous stone and dirty sand be used, a large proportion of cement will be required. For small work a proportion of six to one is satisfactory, and this is, I believe, a strong enough mixture for flags 3 in. thick, if concrete made in the proportion of two parts of well-washed granite chippings to one part of cement be used for the face ½ in. thick. No sand should be used in facework, for if it is present the concrete will wear into holes, as may be seen in many concrete walls. Broken slag makes good concrete, and so does broken brick, but whatever be the material used for the aggregate there must be a sufficient proportion of finer matter, whether this be sand and cement or cement alone, to fill up all the interstices, and make the whole one mass.

Water.—The quantity of water to be used in mixing must vary with the materials employed; for instance, broken brick will require more water than granite; and in frosty weather as little water should be used as is possible. As concrete sets more rapidly at a high than at a low temperature, and it will not set safely in frosty weather, it is desirable, in the construction of slabs, mouldings, and ornamental work generally, that the temperature during the time of setting should be high, and as even as possible; and to meet this end Mr. Faija has invented and patented a process by means of which, slabs or blocks can be moulded one day and turned out the next without resorting to hydraulic pressure, thus doing away with the necessity for a large number of moulds, and reducing the cost of manufacture; and, as I have said before, concrete is eminently adapted for the manufacture of mouldings, which can be made comparatively light, and at the same time very strong.

Cost of Concrete.—The cost of manufacturing concrete varies very largely in different localities, and depends on the distance the cement has to be carried, and on the price of a suitable aggregate at the spot where it is to be used; under ordinary circumstances it is much cheaper than brick or stone work of equal strength, so far as the actual material is concerned, but it cannot be used in the same manner, but must be made into bricks or blocks, or cast into a wooden or metal framework of the form of the building or block to be made, and the cost of such framework must be added to the price of the material and labour. In the case of a dock, or other large work of that description, the cost of the framework will scarcely affect the price of the concrete, but when a single house has to be built, special frames must be made, and they will form a large item in the total cost. When, however, the same frames can be used for many buildings, this expense will be greatly reduced. For a single house it is more than questionable whether stone or brick would not be cheaper than concrete, as either is certainly handier to work with. Mr. Bernays puts down the price of concrete made in the proportion of twelve to one at 7s. 2d. per cubic yard; of nine to one, at 8s. 2½d.; of six to one, at 10s. 3d. per cubic yard; to which must be added from 4d. to 6d. per yard for framing. I believe that pressed concrete bricks may be made cheaply, and that they would be easy to build with and serviceable, and that they can be made with sharp square edges, and faced as required, and at a reasonable price.

Altogether the field for the use of Portland cement is very large, and will, I believe, be still further extended, as greater confidence is placed in the material, which will, in its best form, outlast any stone. I have no doubt that improvements will be made in the manufacture of Portland cement beyond those which have already come into effect, and I trust that both engineers and manufacturers will direct their attention to its perfection and to the extension of its uses, and that between them they may arrive at some standard specification which shall be accepted on all hands.

THE FALL OF A FACTORY CHIMNEY IN BRADFORD.*

THE inquest as to the death of the fifty-four persons killed by this disaster was resumed on the 11th inst., when

John Dobson, mason's labourer, formerly in the employ of Messrs. John Moulson & Sons, the contractors for the erection of the chimney, said that the structure was begun in the year 1862. The foundation stones were laid upon concrete. Four shafts were first sunk, one at each corner, about 8 ft. in width and 20 yards in depth. The shafts were carried through a bed of coal to a depth of 5 yards or 6 yards. The concrete was laid on a substratum of clay and stone, and filled up the shafts. A bed of concrete 2 ft. or 3 ft. in thickness was made, and upon that the foundation stones were laid. When they had erected the chimney to a height of 70 ft. the workmen noticed one morning that it had gone out of plumb. The masters were acquainted with the circumstance, and the work was stopped for ten or eleven weeks, when Woodward, the "Manchester Steeple Jack," came over and straightened it. The chimney was found to be 36 in. out of plumb. After the first cutting it was still 18 in. out of plumb, and the chimney was again cut in the same place, and made straight. Two or three years ago he noticed that the chimney leaned a little in the same direction as it did before it was straightened. He formed the opinion that it had given from the foundation.

By Colonel Seddon.—The space under the foundation from which the coal had been taken was packed with backings.

William Shackleton, mason, said he helped to build the chimney after it was thirty-four yards high. When the structure was seventy yards high they stopped eleven weeks, as the chimney

* See p. 60, *ante*.

was out of plumb. He then refused to work at the chimney any more because it was getting so high and the weather was bad. They put in plenty of "throughs." They were 2 ft. 3 in. apart in height. The stones used for backing were as big as he could lift. The lime was not riddled.

Mr. William Moulson, of the firm of Moulson & Son, who built the chimney for Sir Henry Ripley, stated that he was asked in 1862 to tender for a chimney like one their firm had just built at the Bowling Dye Works. It was to be eighty yards high, with a 9 ft. flue, 24 ft. at the base, with two courses of footings and a foundation of 2 ft. of concrete. The footings were to be 28 ft. square for the first course, 12 in. thick, and the second course 26 ft. square, 12 in. thick. He also, at Sir Henry's request, tendered for a chimney with a 10 ft. flue. Sir Henry selected the 9 ft. flue chimney, and asked the firm to go on with the work. The amount of the tender was 942*l*. 5s. 10d., and 40*l*. for the top. At Sir Henry's request, a tender was got for sinking five pits to the bed of coal, as a foundation. The packing was to be done by daywork, the materials to be all found. Sir Henry told witness that he would get his architect, Mr. Andrews, to prepare plans and to set out the ground. The foundation over the five shafts was to be 2 ft. of concrete. The coal was usually about 2 ft. 6 in. thick at that point. Finally, Sir Henry, with the assistance of Mr. Andrews, his architect, and others, selected the site of the chimney. Finding an indentation of the ground, they examined it and discovered it to be an old shaft up which coal had formerly been worked. They all fell in with Sir Henry's suggestion that this would do, if opened out, for the central foundation pit. The contractor for excavating proceeded to re-open and fill it with packing, after which the other shafts were sunk in due course. All the shafts were filled with packing of Skipton lime, broken stone, engine ashes, and sand, put in as hot as possible and blended. It was not rammed, but was occasionally levelled. The five shafts having been filled up, a bed of concrete, 2 ft. 6 in. thick and 30 ft. square, was placed over them. Upon this, two courses of sound rag foundation-stones, 30 ft. and 28 ft. square, each a foot thick, the joints being crossed and filled in with lime-mortar, were placed. The stones were properly faced and levelled. Mr. Illingworth was the leading man in watching the putting in of the foundations, Mr. Andrews, the architect, not being there. Before the erection of the chimney was commenced, Morpeth, the clerk of the works, with his (witness's) concurrence, suggested that the fire-brick and red brick linings were too light, and that red bricks ought to be substituted for the packing. Sir Henry replied that he thought the packing ought not to be dispensed with. Thereupon Mr. Morpeth said that he had not had much experience of stone chimneys, and that Sir Henry had had considerable experience in building matters. Witness supplied Sir Henry with the difference of the cost of packing, dressed insides and red brick, and the packing originally agreed upon. At Sir Henry's suggestion the thickness of the brickwork was increased to 18 in. halfway up the chimney, and 14 in. for the upper half. Mr. Morpeth, however, said he would rather have it the other way. Witness afterwards agreed with Mr. Ripley that packing for the hearting with the increased thickness of brickwork would be strong enough, and the work started accordingly. No architect was present at the interview at which these arrangements were made. His firm had no specifications either for this or for three other chimneys they built for Messrs. Ripley at their dye works. Mr. Morpeth, the clerk of the works, was constantly superintending, and never complained about the work. When ten yards of the chimney had been built, Sir Henry Ripley said it would look very plain without ornament, and he got designs for holes and panels. Witness, his father, and Mr. Morpeth, protested that these adornments would weaken the structure, but Sir Henry smiled and said, "You must do it my way." The plans were amended accordingly, and holes and panels were built in the chimney as the work went on. On the morning of the 8th of June, when about 70 yards of the chimney were built, it was found to be leaning. Mr. Woodcock and some clerks examined it, and bared the foundation. Mr. Morpeth said that the foundations had given a little on the side towards which it leaned; thereupon the services of Woodman, the "Steeple Jack," were secured. Having examined the chimney, this man convinced Sir Henry that he could make the chimney perfectly straight, and, with Sir Henry's consent, he cut through the chimney in two places on the side opposite to which it leaned. The structure was then believed to be perfectly straight. The builders went on with their work and finished the chimney by the end of November.

Did you form an opinion at the time as to the cause of the canting of the chimney?—No, unless it was, as is often the case, that the sun had softened the work on the south side. I also thought that the foundations had given way a little. Witness went on to say that three years after its completion their firm, at the request of Sir Henry Ripley, took out certain bulges on the side opposite to where it had been cut. They laid bare the hearting, which appeared to be sound. They were not limited, but were to effect all necessary repairs. The straightening operations would necessarily break a large number of the "throughs." He had noticed within the last five or six years that the chimney was leaning more than before, and that it was worse still about six weeks since. When the chimney was half built Sir Henry Ripley said he thought it would look stiff, and that it had better be carried to a height of 100 yards, but after the "Steeple Jack" had done his work that idea was abandoned. The total weight of the chimney standing upon this 30 ft. square base would be from 4,000 to 5,000 tons. In his opinion, the strength of the chimney lay in the inner lining rather than in the backing. His firm selected the best men they had to do the work, and their instructions to the men were to do the work to the best of their ability. They were paid for day work. There was no fault found with their not getting on fast enough, and they took their own time. The firm wished to make as good a job of the chimney as they could.

Colonel Seddon.—Do you now think that the effect of the alteration suggested by Sir Henry Ripley was to weaken the chimney; that is, the suggestion to substitute common brickwork below, and so reduce the thickness of the backing?—I think it would strengthen the chimney considerably. This opinion as to the superior strength of the lining I base on the fact that the beds are level and thin, making the work more solid and firm.

Do you think that in this case the inner lining could have stood without the backing?—Yes.

Joseph Moulson, of Little Horton-lane, said that at the time of the erection of the chimney he was foreman to Messrs. J. Moulson & Sons. He superintended the sinking of the shafts for the foundations. The walls of the old pit shaft were found to be in a very good condition, there being no bulges anywhere. They extended to the bottom of the bed of coal which had been got. The roof of the workings in which the coal had been got thirty years before was in fairly good condition. He was not sure that the four shafts sunk for the faundations were taken down to the bottom. The workings were filled up and lightly packed for a radius of about twelve yards round the old pit shaft, then the headings were filled in with concrete. The shafts were filled up with concrete, which was also used for the bed of the foundation.

By Mr. Atkinson.—I had had thirty years' experience of laying foundations at that time. The work was thoroughly well done, and the means adopted were the best that could be devised under the circumstances. I was aware of the height to which the chimney was about to be carried, and I considered the foundations strong enough to bear the weight.

The Coroner.—Within the last two or three years, has there been a deep cutting made in connexion with the Great Northern branch line on the south side of Ripley-street?—Yes, it was made a few years since, and is almost in a direct line south with the chimney. The cutting is from 20 ft. to 30 ft. deep, as far as I can tell, and it is from 60 yards to 80 yards from the chimney.

In making the line, do you know whether the company packed or let down the old workings?—I cannot say.

A Juror.—Is it falling ground down to the chimney from the railway?—Yes.

Are the concrete foundations of the chimney lower than the railway line?—I should think they are about on the same level.

William Boocock, a coal-miner and shaft-sinker, said that he had fifty years' experience in his trade. In the year 1862 he was employed on the Newlands chimney foundations, working under Thomas Pitts, who died ten years ago. Witness saw the old pit shaft opened, and assisted in clearing it out. As nearly as he could remember, about 12 yards square was clear, the seam of the better bed coal being reached.

By Mr. Atkinson.—Four pillars of coal, each about two yards by one yard in thickness, had been left at the bottom of the shaft. They were 30 in. high. The workings were packed six yards beyond that.

The inquiry was again adjourned.

ARTANE INDUSTRIAL SCHOOLS.

THIS school, which is situated three miles from Dublin, was visited recently by the Lord Lieutenant. The building comprises a central block affording ample accommodation for the Community, the extensive class-rooms, trades and training rooms, dormitories, and main staircases, being situate at either side, east and west. The main corridors at back extend through the entire building into which all the apartments open. The chapel on the first floor, and refectory under the same, extend out at the rear of the central block. All culinary offices, &c., are in immediate connexion with the refectory on the ground-floor.

The principal apartments being in three stories about 18 ft. from floor to floor, afford accommodation for 700 boys, independently of the Community. Perfect ventilation has been insured throughout by apertures for fresh air, 6 ft. above floors, acting vertically, and foul air exits under ceilings in all the apartments. The main dormitories, having windows at either side, contain about 120 beds each, allowing 700 cubic feet air-space to each boy.

The entire frontage measures 366 ft. by 58 ft. in depth, and 78 ft. in height. The unusual height and extent of the edifice render it a most conspicuous object in the landscape for miles around, and the upper stories afford charming views of scenery over land and sea.

The style of the composition is Italian, the walls being of limestone from the district, in combination with Portland cement concrete, with which all the jambs, arches, fireplaces, niches, &c., have been executed, with decided economy; the entire front and ends, with all decorations, being in Portland cement, and the entire cost has been estimated at about 40,000*l*. It has occupied about eleven years in construction.

Special provision has been made for life protection in case of fire. Grand staircases, 6 ft. wide, are provided at either end of the main building, and also stairs at either end of the central block, the upper apartments and corridors being in direct communication throughout the entire length on each floor.

The designs were prepared by Mr. Charles Geoghegan, architect, under whose superintendence the entire works have been executed.

SETTING A CHIMNEY UPRIGHT.

THE large chimney at the Staleybridge Spinning Company's works, New Mill Yard, which is near its completion, and will be seventy-five yards high when finished, has unfortunately commenced to lean, and was a week ago over 20 in. out of plumb. The architects, Messrs. Potts, Picup, & Dixon were uneasy over the same,—no doubt on account of the sad fatality at Bradford, and, again, on the builders refusing to finish the chimney. But on the 2nd inst. the able sorvices of Mr. Jos. Ball, "Steeple Jack," of York Castle, Oldham, were called in. This person, who has had a lifetime of practice attended with success, has, I am glad to say, brought the chimney plumb within 4 in. up to Jan. 15, and has gratified the directors with a promise that he will have the chimney straight by their meeting on the 18th, and will complete the brickwork and build on the new top in the course of a few days after. If he is successful,—and which I hope he will be, without damage to life or property,—I will write you in due course.

THOMAS JACKSON.

The Royal Academy. — At a general assembly, held on Tuesday evening, Mr. Benjamin William Leader, painter, Mr. Thomas Brock, sculptor, and Mr. Francis Holl, engraver, were elected Associates.

ON SCHOOLS.

THE new Board Schools in Icknield-street, Birmingham, were opened on Monday last by Mr. A. J. Mundella, the Vice-President of the Council of Education. The schools are on the system of separate class-rooms, and have been erected, at a cost of 10,700*l.*, to accommodate 870 children; that is, at a cost of 12*l.* 6s. per child. There is attached to the schools a science-class, which will accommodate about 90 additional children.

Mr. Mundella made a speech, some portions of which, bearing upon school buildings, are here given:—I rejoice to find that the school is built on a principle which I have always advocated. I have seen this kind of school in almost every country in Europe, and in most of the States of America, and it possesses in a very high degree all the physical conditions which are requisite for successful teaching. After the Parliamentary session I was passing a holiday in Switzerland, to get a breath of air on the Alps, and the landlord at Lucerne showed me the new schools, of which he said the inhabitants were proud. Lucerne is a town of 20,000 inhabitants, and the Swiss are poor people; but they have erected a magnificent and almost palatial building of freestone, with large folding-doors that open into a hall of marble, with a fountain and a bust of Pestalozzi in the centre. They have wonderful mechanical contrivances for giving object-lessons, and a science-room, fitted with a magnificent laboratory. Yet this is only an elementary school. It will accommodate 800 boys, and they consider it cheap at about 25,000*l.*; that is, at a cost of about 31*l.* per child. I am sure that if the School Board of the wealthiest English town had attempted anything like this they would have been consigned to the winds at the very first election. I hope that the day will soon come when the walls of school-rooms will be beautiful. Nothing will do so much to elevate the masses; nothing will do so much to render people dissatisfied with the squalor and misery of their own homes, as cheerful, bright, and somewhat decorative schoolrooms. This is a genuinely philanthropical movement, teaching, by the example of the schools, the working masses to take a greater interest in their homes. The class-room system is an aid to the teachers, by not making the demands on the children which are made when they are disturbed by external circumstances. It may be asked why, if I approve of the class-room system, the Department did not prescribe that system? To that question I would reply that they consider it better to leave the Boards free to find out by experiment what is the method best suited to their locality, and the result may be that Englishmen will work out a system which, though not the same as the American system or German system, will be more thoroughly adapted to the wants of the English people.

With regard to instruction in the elementary sciences, it quickens the children's aptitude for the acquisition of knowledge in other branches. It is quite necessary, however, to bear in mind that, before attempting higher grades of schools, we should make sufficient provision for all the children who require the mere rudiments of education. If I am asked whether there is not danger of over-educating, I say, no; and I will tell you why. Our idea of education is the lowest, certainly, on this side the Alps. Those who have had the longest experience in education, those nations which have spent most on it, are at this moment making the greatest efforts. The educational impulse throughout Europe is something one can hardly believe, and it is so because the people on the Continent have found that knowledge is power, not only military power, but industrial power. Whereas in Birmingham, last year, the expenditure on education was 2s. 3d. per head, in Paris it was 12s. I urge you not to rest until every child in our country is well trained in the love of truth, of virtue, and of God.

To show what progress has been made under the Education Act of 1870, I will give you a few statistics. In 1870 there were school-places in elementary schools for 1,878,000 children; in 1882 they were 4,538,000. The scholars on the registers numbered in 1870, 1,693,000; and in 1882, 4,190,000. The average attendance in 1870 was 1,152,000; and in 1882, 3,015,000,—nearly three times as many. In 1869-70 the grants amounted to 1,072,000*l.*; in 1882-3, to 3,599,000*l.*; and the next Budget the amount would probably be 3,800,000*l.* I am the Oliver Twist of the Government, continually asking for more. Not only has there been this increase in the educational provision of the country, but a still more satisfactory thing is the increase of quality in the education. What are the results? We can see some of its results already, but are only yet on the threshold of the work. Education is telling on juvenile offenders and on the manners of the young people of the population, and it will soon tell, I hope, on the language of our streets and workshops. Crime and pauperism are undoubtedly decreasing, but we have yet more persistently to go deeper down to the residuum and bring the poor Arabs out of the streets. I congratulate all the workers in primary education on the work they have done and are doing. They are civilising the people of England, doing the noblest work this great nation has ever put its hand to.

Mr. Chamberlain, Member for Birmingham, and President of the Board of Trade, also addressed the meeting, saying:—

The educational accommodation provided in the whole country since 1870 has increased 148 per cent.; the average attendance has increased 170 per cent.; in Birmingham the accommodation has increased 100 per cent., but the average attendance has increased 202 per cent. That is to say, for one child who went to school in 1869 in Birmingham, three are going now. I consider that the result of the last School Board election in this town was a vindication of the policy of the old Board; I do not believe in cheap school buildings. Education is a privilege and not a punishment, and we want to make it attractive and not repulsive. Still less do I believe in cheap education. Anything more mean and contemptible than the doctrine of cheap education I never heard of. The national education given in the elementary schools should be the best possible of its kind. Where is this doctrine of cheapness to end? Some people would save the money which is expended in beautifying our parks and public gardens with the flowers which, at a proper season of the year, are to be found there. When I think of the way in which wealth is distributed in this country, when I think of wanton luxury and wasteful extravagance on the one hand, and grinding poverty and unremitting toil on the other, I do not admire the wisdom nor envy the generosity of the man who would refuse to do all in his power to level the distinctions which now separate class from class, who would refuse the very poorest of his fellow citizens every facility in his power to better his condition, who would deny to the poorest the opportunity of enjoyment, and the advantages which education brings in its train. I hope the Birmingham School Board will go on boldly in its noble task, and that every child in Birmingham needing instruction will soon have its appointed place in the national schools, and that in those schools it will receive such an education as will develope to the utmost its faculties, fitting it for its duties as the future citizen of a free State.

MR. P. H. CALDERON, R.A., ON AFFECTATION IN ART.

MR. P. H. CALDERON, R.A., in distributing the Government and other prizes at the St. Martin's School of Art, Endell-street, on Thursday evening, the 11th inst., made the following remarks. He said:—I do not intend in any way to attempt a lecture to-night, but I want to say a few words to you as one art-student speaking to other art-students. We all belong to the same profession, therefore let us talk together like fellow-students. From what I recollect of these schools of art, they were all founded some thirty odd years ago by some very clever people, with the Prince Consort at their head, with the intention,—not of creating artists, as so many people fancy, because artists somehow or other will always come to the top, whether you have schools of instruction for them or not. There were no art schools to speak of in the time of Hogarth, or of Sir Joshua Reynolds, or of Turner,—but the intention of the promoters of these art schools was to create art-work, and perhaps behind all there was an idea that the general public who would not enter the schools at all, would yet benefit by them in an artistic sense. That they be benefited by them, and that they will be benefited by them a great deal more in the future, I think we may very safely assert. I should like, then, to divide the students into three portions. I believe a small, a very small, minority of you are very likely to become artists in the sense of the word as usually accepted; that is to say, people who paint figures or landscapes, or who sculp, but they will be a very small minority, and one need not say much about them. Next, and probably the largest class, will be those who will become art-workmen or art-workwomen, those who will devote the whole of their lives to the improvement of art-manufacturers. Then there will be a small residuum who will become neither the one nor the other, but who will certainly have gained some benefit from their connexion with these schools. The instruction they had received will surely tend to their greater happiness, to their leading better lives, and to their appreciating the beauties of nature with a much keener sight than could have been hoped for otherwise. It will even make them, if one may use so ambitious a phrase, better citizens in this sense,—that in the old days of Florence the citizens had to select the artists to execute the public works, and they were able to do this because art, as it were, permeated the very atmosphere, and every one more or less imbibed a feeling for art. So if a church was to be built, or a gate to be put up, the work was always given to the best man. Well, then, looking upon you as those who, for the most part, are going to adopt art in some form or other as the business of your lives, I may just say that there is one piece of advice that cannot be given too often to those connected with art and art-manufacture in this country, and it is this,—avoid affectation. Always aim to be simple and to be true, and to avoid affectation as you would avoid scamping your work, or anything else that is objectionable. To put that in a homely way to you, I would say that, of course, when you, as young fellows, begin your art work in life, it is very natural, and there is nothing blameable in the fact, that you should turn to other authorities to assist you and guide you in your first steps. But remember this, that whereas the true, correct, and beautiful things of this world are quite out of our reach in the way of imitation, the false and sham things are always easy to copy. If, for instance, in the street, or anywhere else, you see a remarkably well-formed, handsome man or woman, and you want to describe that individual to a friend, you will find it almost utterly impossible to reproduce him in your description, because there will be nothing peculiar to lay hold of. If you wanted to make a slight sketch or caricature of the Parthenon you would find it utterly impossible to do so. There is no such thing as a caricature of the Parthenon. If you wanted to make a caricature of a Titian, I defy you to do it. It is not to be done; but if you see an unfortunate creature whom God has afflicted by making him a hunchback, there is no difficulty in making a caricature of him. If, instead of the Parthenon, you get an ultra Flamboyant style of architecture, which is of itself almost a caricature, there would be no difficulty in designing something that would make people immediately say, "This is the architecture of a certain date." And so in painting. Although you may find it utterly impossible to make a drawing exactly like a Raffaelle or a Titian, if you were to take a Botticelli there would be no difficulty in making a caricature of that which would fasten the attention of people, and make them call out, "Botticelli." Remember that affectation is always easy; imitation of defective things is always easy. But you have not to imitate these things; you have to found yourselves upon what is really true, and having embodied and made part of your art the works of a great man, you have to bring out, not Botticelli, not even Raffaelle or Titian, but yourself. I have mentioned Botticelli, but do not for one instant imagine that I am endeavouring to run down the merits of a man who was an extremely remarkable master of his time. He was a man of infinite accomplishments,—a musician and a poet, as well as a painter,—whose drawing in parts was so excellent that no man can refuse to admit it; but he was a man through whose whole life-work there runs a little strain of affectation that throws a blemish on it all. Florence is full of frescoes by Botticelli. The galleries contain collections of them, and look at them all and study them all; there is scarcely one of them where you could find a figure that has not some little trifle almost impossible to describe,—some little trace of affected grace which spoils the vitality of the whole thing. I mention Botticelli because it

seems to me that his influence is a great bane of our time. Within the last twenty years the influence of Botticelli has come amongst us as a sort of poison. Many men of immense talent, men of refinement, men of high education, wishing to be artists, had looked round for something to cling to and to fasten their art upon; and finding they could not fasten it upon Titian or Raffaelle, or Velasquez,—it is utterly impossible, because they are quite unapproachable,—they have fastened it upon a man whose work it is comparatively easy to imitate, and so we are flooded in paintings of long, consumptive, long-necked creatures with long hair, fit subjects for the hospitals, things that are purgatory to the real artist, and yet things that he fears to say anything against for fear that he should be thought jealous of their painters. To those amongst you who intend to be artists, I would say, fix in your minds this: always think of it; never let it slip out of your mind. Be original. Every great man, every really great man, every man of ascertained, undisputed genius, had this quality,—he has been a man full of common sense. Whether you take Shakspeare as a poet, or Titian as a painter, or Phidias as a sculptor, there is no one single grain of insanity in the whole of them. Whatever they did was sane, while their creations were also sane. No man has been more fanciful than Shakspeare in his "Tempest" and "Midsummer Night's Dream," in his most poetic conception of the little beings that shelter under the leaves of plants, but the connexion of all of them is perfectly sane, and they act on the rules upon which every sensible person acts. The same is true of Titian, whether he painted nude gods and goddesses,—and they were ordered by lewd princes who desired them; whether he painted "Holy Families" or "Last Suppers," his people always acted sanely. It is the same with Raffaelle as with Titian, the same with the gods and goddesses of Phidias, the same with the noble people of Velasquez, and all the great painters. There are no feeble or moonstruck people to be found in their work. They are all clear-headed people; therefore, if I might sum up these words with a short sentence which strikes me at this moment, which will readily fix itself upon the memory, I would say, "The nearer you get to perfect sanity the nearer you will be to God."

The Rev. R. G. Maul, who has been honorary secretary of the school for upwards of twenty years, and is vacating the post on account of his removal to the country, was then presented with a portfolio of very beautiful sketches, contributed, amongst others, by Seymour Lucas, T. H. Schafer, J. Parker, H. C. Pocock, Ned Swain, J. E. Breun, H. G. Moon, A. W. Mason, F. Callcott, and others.

OBITUARY.

Mr. William Higgs, a well-known builder, who was President of the Builders' Benevolent Institution in 1877, died on the 3rd inst., aged fifty-eight, deeply regretted by all who knew him. He was for many years a Guardian of the Poor of Lambeth, and a deacon of the Metropolitan Tabernacle (Mr. Spurgeon's). The successful career of the deceased offers a signal example of perseverance. He was apprenticed at the age of thirteen years to his uncle, Mr. Joshua Higgs, then of Davies-street, Berkeley-square, and as soon as his apprenticeship expired, he determined to start in business for himself, having saved out of his earnings the sum of 50*l*. He very soon made his way, and in a few years had a large business, his indomitable perseverance and strict integrity keeping him in the right course to make his mark amongst London builders and men of influence. When at the age of about thirty-five years, he was carrying on as much work as any builder in London at the time, the following large works being in course of progress under his immediate supervision, almost simultaneously,—the Guards' Barracks at Chelsea, the Royal Marine Infirmary at Woolwich, the Metropolitan Tabernacle, and Office of Works contracts, London. The principal line of his business ran in Government contracts at her Majesty's dockyards, arsenals, and public buildings, barracks, police-stations, post-offices, &c. His natural generosity always came to the front when he happened to be the successful contractor for works in connexion with philanthropic objects. The London Orphan Asylum at Watford, and the Royal Albert Orphan Asylum at Bagshot, are both witnesses to this fact. It is said of him that no employer was more respected, for he was fair and honourable in all his dealings, and always had the welfare of his men at heart. On the first Saturday half-holiday he gathered all his *employés*, with their wives and families, in his grounds at Stockwell; he also gave an annual Christmas tree and entertainment at his workshops, Crown Works, South Lambeth. He took a great interest in the poor, and was for twenty-one years on the Lambeth Board of Guardians, where his judiciousness and business insight were always manifest. Amongst his private speculations were the large and well-known Crown Swimming Baths, Kennington Oval, and the Victoria Baths, Peckham. He retired from business in 1874 when Mesrrs. Hill, of Islington, joined his eldest son as his successors, the business still going on as Messrs. Higgs & Hill, Crown Works, South Lambeth. Since then his time has been fully occupied with the many works of charity to which he had put his hands, especially those which emanate from the Metropolitan Tabernacle, where he had long been Mr. Spurgeon's right hand, being a trustee and treasurer of the Stockwell Orphanage. His health had been failing for the last two years, but no serious termination had been anticipated. He passed away somewhat suddenly at his residence, Gwydyr House, Brixton Rise.

Mr. John Spicer.—Last week passed away another of the by no means small class of conscientious speculative builders that we have known during our professional career, and many of whom we still know despite the popular idea that nothing but shiftiness and chicane are to be found in the calling. Mr. John Spicer, whose death we thus record, commenced building in Pimlico in the early part of the year 1845, and in 1856 took very largely of the building land in South Kensington on the estates of the Colonels Robert and James Gunter, his earliest undertaking there being the completion of the whole western side of the much-appreciated "Boltons." Since then, his building progress has been steady and successful, Moreton-gardens, Bolton-gardens, Gledhow-gardens, and Wetherby-gardens, having been built by him, and several of the large mansions in Cromwell-gardens.* Thoroughness was with Mr. Spicer a first consideration. Few men have given more thought or care to their business, and his desire always was that whatever he undertook should be done in the best manner.

THE JUNIOR ARMY AND NAVY CLUB, ST. JAMES'S STREET.

THIS club was opened on the 13th inst., after enlargement and partial reconstruction. The site on which the club is situated is 154 ft. long and 48 ft. wide, the longer frontage being in King-street, and the shorter in St. James's-street. The lighting of the basement is good, and the accommodation is ample. The kitchen is lined throughout with white tiles, and adequately fitted up. Larders, pantries, cellars, still-room, and servants' hall, and every requisite for the service of a large establishment, have been provided. There is a lift to the principal serving-room from the kitchen, and another from the still-room to all the upper floors.

The entrance-hall, with the passage leading from it, is paved with white marble, and from the back of it rises the principal staircase. In arranging this there was considerable difficulty, as it was desired to secure an ascent more easy and comfortable than the original staircase afforded, or the space would readily allow, but this has been surmounted, and a very satisfactory staircase obtained, made of oak throughout. The dado is not yet fixed. The drawings for the staircase were prepared by the architect, Mr. Wyatt Papworth, with great care, and equal pains have been taken to secure first-class materials and workmanship. There are handsome spiral balusters, and the newels, which are bold and massive, are capped alternately with mural and naval crowns. The stairs are well lighted by a large skylight and gas sun-lights, thereby ensuring good ventilation.

The rooms on the ground-floor are 20 ft. high; to the east of the entrance-hall is the ground-floor smoking-room, 37 ft. by 18 ft.; round the walls a shelf is provided, on which glasses can be placed, so as to obviate the necessity for small tables. On the other side of the entrance-hall is the morning-room, which is divided into two portions, communicating by wide openings, on both sides of a fireplace; one portion, 43 ft. long and 21 ft. wide, has three bow-windows looking into King-street, and the other, 37 ft. long and 14 ft. wide, has a bow-window at the end in King-street, and three windows, one of which is the large bay, newly built, looking into St. James's-street. Beyond the ground-floor smoking-room are the stairs to an entresol, containing an unusually spacious and well-lighted lavatory, a large dressing-room, three bath-rooms, which will also serve as dressing-rooms and other conveniencies. The ventilation and the sanitary arrangements have been carefully attended to.

The first floor is appropriated to the smoking-room and coffee-room. The former is in two portions, corresponding to the morning-room below, and with a similar bay-window in St. James's-street. It has a parquet floor, carved wooden chimney-pieces of good design, and tiled fireplaces and hearths, as in the other principal rooms. The furniture of this room is entirely new, and made of oak, covered with olive green morocco. Seats are provided in it for about sixty persons, but double this number could with ease be accommodated. The coffee-room has a width of 23 ft. and total length of 85 ft., and it has also a parquet floor, tiled hearths, and fireplaces, and large mirrors like those in the morning-room.

On the second floor, in the St. James's-street front, is the library, a comfortable well-lighted room. The billiard-room on this floor is lighted from the roof, and affords space for two tables, with plenty of seats; it can, if necessary, be divided into two rooms, and has a lavatory adjacent to it. Next is the card-room, giving ample room for four card-tables, and the remainder of the floor is utilised for club offices, other dressing-rooms, &c. On the floor above this, which is entirely new, there is accommodation for about forty servants.

The committee consider that the club is much indebted to the architect, Mr. Wyatt Papworth, who designed the re-construction and alterations so as to secure every available inch of the space, and who has managed with great tact the many negotiations with the Crown Architect, and given his able assistance during the progress of the work; to Mr. J. Hungerford Pollen for his very valuable advice as to furnishing and decorating the club rooms, which has enabled the committee to lay out to the best advantage the funds available for this purpose; and to the club builder, Mr. W. Cole, who has devoted his whole time and energies to the work from the commencement, and has shown great skill in overcoming many difficulties of no ordinary nature.

* The list of the present tenants on the estates includes some well-known names, viz.:—Colonel Henderson; Mr. F. A. Milbanke, M.P.; Mrs. Otto Goldsmidt (late Jenny Lind); Madame Albani; Mr. W. S. Gilbert, &c.

COMPETITIONS.

Swansea Baths and Laundry Company.—Neither of the fourteen plans sent in will be adopted; the premium has been awarded to Mr. Fowler, of Brecon.

New Municipal Buildings, Nottingham.—Full instructions and plans of site have been issued to architects with reference to the competition for these proposed new buildings, signed by Mr. S. G. Johnson, Town Clerk, and Mr. M. Ogle Tarbotton, Consulting Engineer to the Corporation. In the first instance, only plans will be required or accepted, and elevations will not be admitted. From the plans sent in in this preliminary competition, a limited number, not exceeding eight, will be selected, the authors of which will be invited to enter into the second competition, in which, of course, elevations, &c., will be included. There is no undertaking to employ the selected architect, but the architect whose design appears to be in all respects the best will be awarded a premium of 300*l*., to merge in the commission if he be appointed to carry out the work. The architect whose design is selected as second best will be paid a premium of 200*l*.; while the author of the third best design will receive a premium of 100*l*.

Electric Exhibition at Vienna.—An International Electric Exhibition will be opened in Vienna on the 1st of August next, closing on the 31st of October.

TO RENDER TEXTILE MATERIALS INCOMBUSTIBLE.

AT one of their recent meetings, the Société d'Encouragement de l'Industrie accorded to M. Abel Martin a premium of 1,000 francs for his method of rendering textile fabrics, &c., incombustible. The following are the preparations used :—

For light-coloured materials : — Sulphate of ammonia (pure), 8; carbonate of ammonia (pure), 2½; boracic acid, 3; borax (pure), 2; starch, 2; and water, 100 kilogrammes. The solution was applied at a temperature of 30° C., the materials being saturated several times with it. The liquid costs less than 1½d. per litre.

For painted curtains, stage wings, furniture, panelling, window blinds, &c. :—Sal ammoniac, 15; boracic acid, 5; soaked glue, 5; gelatine, 1½; water, 100 kilogrammes, with sufficient lime. This mixture must be kept at a temperature of 60° to 80° C., until it assumes the consistency of oil, when it is applied with a brush. Stage wings, &c., already painted are coated with the solution on the other side. Frames and posts receive two coats. With one kilogramme, which costs about 7s. 6d., 7 square mètres may be coated.

For coarse curtains, cords or ropes, straw and wood, &c., 15 kilogrammes of sal ammoniac, 6 of boracic acid, 3 of borax, and 100 kilogrammes of ordinary water are taken. The mixture is kept at a temperature of 100° C. for from fifteen to twenty minutes. This liquid costs about 2d. per litre.

For paper of every description, the following ingredients are taken :—Sulphate of ammonia, 8; boracic acid, 6; borax, 2; and ordinary water, 100 kilogrammes. This mixture is heated up to 59° C., and costs 1½d. per litre.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

74. J. Betjeman, London. Fire-screens. Jan. 5, 1883.

102. G. D. Peters, London. Apparatus for facilitating the action of spring rollers for window-blinds. Jan. 8, 1883.

122. A. B. Wren, Bideford. Joints of sanitary pipes, &c. Jan. 9, 1883.

152. W. P. Thompson, London. Manufacture of cements, mortar, artificial stone, &c. (Com. by MM. R. Dosse and P. E. Freise, Brunswick, Germany.) Jan. 10, 1883.

158. E. Edwards, London. Apparatus for cutting marble, granite, &c. (Com. by A. Jeansaume, Paris.) Jan. 10, 1883.

162. J. Shaw and F. Milan Lockwood. Apparatus for indicating the presence or absence of water in house cisterns. Jan. 11, 1883.

169. W. Berry and P. Stuart, Edinburgh. Pavement. Jan. 11, 1883.

NOTICES TO PROCEED

have been given by the following applicants on the dates named :—

Jan. 9, 1883.

4,219. J. B. Shaw, Tunstall. Decorating bricks, tiles, &c. Sept. 5, 1882.

Jan. 12, 1883.

4,618. E. Whillier, London. Firegrates or stoves. Sept. 28, 1882.

ABRIDGMENTS OF SPECIFICATIONS.

Published during the Week ending January 13, 1883.

2,590. T. H. P. Dennis, Chelmsford. Glazing. June 1, 1882. Price 6d.

The sash-bar consists of an upper part or cap, which projects over the panes of glass, and fits into a lower part, on which the glass rests, and to which the upper part is secured.

2,607. W. H. Lindsay, London. Construction of floorings for bridges. June 2, 1882. Price 6d.

These are constructed of alternate V and inverted Λ troughs connected together, the apex of each trough being formed of flat horizontal plates, one of which serves as a bearing for the roadway, while the other rests on the girders or supports.

2,614. C. E. Green, London. Domestic stoves or fireplaces. June 3, 1882. Price 2d.

The products of combustion are taken from the fire over the tops of the back down behind the same through an opening just above the bottom bars of the grate into the fire, thence through the closed ashpit below the grate to two side flues, by which they pass to the chimney. (*Pro. Pro.*)

2,717. J. Casey, London. Water-closet apparatus. June 9, 1882. Price 2d.

This provides a douche for the person while seated on the closet. (*Pro. Pro.*)

3,614. T. Hyatt, London. Illumination of gratings. July 31, 1882. Price 4d.

Instead of resting small pieces of glass in metal frames, the top is wholly formed of glass, under which are placed the lens-faced glasses. These gratings are supported at intervals by bars.

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

ELEVATED RAILWAYS.

THE advantages which have been found in London, New York, and Berlin to accrue from a properly organised system of local traffic have (according to a recent number of the *Cologne Gazette*) been fully recognised in the deliberations now being carried on in Paris and Vienna upon this important subject. In the latter city it is stated that a concession has been granted to an English contractor for a local railway, while in the former capital a warm argument is being carried on between the advocates of the London underground system and the partisans of the more recently perfected theory of Chrétien. This last-named system is based on the arguments that underground railways are too dear and too inconvenient, and that "pillar-railways" can alone be expected to be a commercial success, as they have not to pay for any ground. The profitable working of such lines is enhanced, it is urged, by the use of electricity as a motive power, inasmuch as the abolition of heavy locomotives allows of a less massive construction of the track, while the reduced intervals at which trains can be run enable this kind of railway to enter into close competition with tramways for the conveyance of passengers from one part of a city to another.

A BUILDER'S CLAIM FOR PLANS.

MAXWELL *v.* SCOTT.

IN this case (heard in the Lambeth County Court last week) a claim was made for 3*l.* 3s. for plans.

Plaintiff is a builder and contractor carrying on business in Brixton-road, and the defendant resides in the same neighbourhood. According to the plaintiff's statement, the defendant's brother called upon him one day, and acquainted him with the fact that the defendant wished to erect a coach-house building in the Brixton-road. As a result of this conversation, plaintiff agreed to prepare a plan of the proposed building, but had heard nothing more either of the plan or the building.

His Honour said the plan had only been prepared for the purpose of pleasing a probable customer, and plaintiff could only recover if he could actually prove that his plan had been used. Judgment would, therefore, be for the defendant.

HOUSE SANITATION AND THE NUISANCES REMOVAL ACT.

A CISTERN IN A VERY BAD POSITION.

MR. THOMAS EAST, owner of a house in Peckham Park-road, appeared to a summons taken out by Inspector Fisher, on behalf of the Vestry of St. Giles, Camberwell, under the Nuisances Removal Act, at the Lambeth Police Court, on the 6th inst. The summons set forth that at the house owned by the defendant there existed a cistern under the floor of a water-closet in such a position as to be a nuisance and injurious to health. Mr. Grain, barrister, defended.

The inspector was called, and said he examined the premises and found a cistern just underneath the floor of a water-closet. The cistern was open, and the covering was really the floor of the closet, with only a short space between.

In cross-examination, the witness said he left it to the medical officer of health to say if it was a nuisance and injurious to health.

Mr. Grain expressed an opinion that according to the Act it must be shown to be an existing nuisance.

Mr. Chance (the magistrate) said it would be injurious to health if the position of the cistern was such as described.

Mr. Grain contended that it must be shown to be an "existing" nuisance.

Mr. Chance said he could not read the Act in that way, and according to what he gathered, there was a more serious matter in the fact of a connexion of the water so close to the drain.

Dr. Bristowe (the medical officer of the parish) was called, and said he had examined the premises. With regard to the cistern, he considered it was a nuisance within the meaning of the Act, and dangerous to health. The floor of the closet was really the lid of the cistern, and anything soaking through this floor would go into the cistern. Slops or other matter spilled in pouring down the closet might go on the floor and thus soak through. Gases of all descriptions might impregnate the water in the cistern, and might induce typhoid fever. He also objected to the overflow-pipe in the cistern, which was connected with the drain, and considered there was not a sufficient trap, but at the same time believed even with a trap it would be dangerous to health.

Mr. Grain contended that the summons could not be sustained under the section of the Act, as the cistern in question could not be "premises such as would be injurious to health," and urged that the Legislature never intended such a thing. The learned counsel proceeded to argue upon other points in the law upon the subject.

Mr. Joseph Gale, surveyor, was called on the part of the defendant, and gave evidence. The defendant also stated that he had lived in the house for years, that there had been no illness, and that the tenant since had not suffered.

After a long argument upon the various points in the law of the case,

Mr. Chance said he was of opinion the matter came under the section under which the defendant was summoned. He held that the cistern was in a position which was injurious to health,—or, in the words of the Act, "the premises are so constructed as to be injurious to health." He therefore made the order asked for by the Vestry for the removal or abatement of such nuisance.

ALLEGED OBSTRUCTION OF LIGHT.

GARDNER AND OTHERS *v.* WHITELEY.

THIS was an action brought to obtain an injunction to restrain the defendant, the "Universal Provider," of Westbourne-grove, from obstructing the access of light and air to some ten houses in Porchester-gardens, Bayswater, and to recover damages for the alleged obstruction.

The case was heard at the end of June last by Mr. Justice North, sitting for Mr. Justice Kay, and the hearing lasted three or four days. The houses belonging to the plaintiffs were alleged to have been completed on or before March, 1861, and the writ in the action was issued on April 2nd, 1881. The defendant, in the autumn of 1880, constructed extensive new premises, part of which extended the whole length at the back of the row of the houses belonging to the plaintiffs, and the main question in the case was whether or not there had been any actual obstruction to the lights of the houses of the plaintiffs. A further question in the case was whether the houses belonging to the plaintiffs had or had not been completed on or before March, 1861, and that so there had been no enjoyment of the lights which were alleged to have been interfered with by the defendant for the full period of twenty years. Evidence was given at the hearing as to the exact date at which the houses had been actually finished, a question of law being involved in the case as to whether or not any right to lights could be obtained at a time when any houses were still unfinished.

Mr. Justice North, in giving judgment, dismissed the action with costs against the plaintiffs, except such as had been occasioned to the plaintiffs by the defendant's plea that there had not, in fact, been any actual obstruction of light. As to the costs of that issue, the learned judge directed a set-off as against the general costs of the action.

HARDENING FLOORS.

SIR,—I wish to harden and render non-absorbent the deal floors of a cottage hospital, and I shall be much obliged if you could indicate a process or composition for that purpose.

G. R.

*** Some observations will be found in a recent number, p. 56, *ante*. The most durable floor-paint is there said to be that composed of linseed oil varnish. It makes the floor water-resisting.

OFFICES FOR THE CHELTENHAM GAS COMPANY.

SIR,—I cannot allow Mr. Paterson's letter, published in your last week's number [p. 61], to pass unnoticed, although I cannot so presume upon your space as to give lengthy explanations of the whole facts of the case. Suffice it to say that I should not have deviated from my original estimate in the least degree had it not been for misleading representations made to me that money was not so much an object as a handsome and substantial building, and that I should not be strictly bound to my estimate. Again, when deductions were proposed to be made, still having the same idea impressed upon me, I retained portions of the additional work, so that when the second tenders were examined, they still exceeded my original estimate. Finding that the whole blame of this fell upon myself, I resolved to act solely upon my own responsibility, and to ignore all the advice so freely bestowed upon me. I therefore gained the permission of the directors to obtain a third set of tenders, the plans being reduced to

the same standard as my competition-design, the estimate for which was 5,583*l*. When these tenders were received (of which several were within my estimate) the directors refused to open them, on the grounds of their manager's objections that I had not acted entirely in compliance with his wishes as expressed at our meeting. I therefore declined to go any further in the matter, and was advised to take legal proceedings against the directors. I, however, for the sake of peace and quietness, decided to let the matter drop, the directors paying me a nominal sum for my drawings, until I observed that the directors were again advertising for tenders, when I thought it but right to publish the former lists.

ALFRED SMITH.

CIRCULAR ARRANGEMENT OF CLASS-ROOMS.

SIR,—In your last issue, in a notice of the designs for the new Finchley Board Schools, you refer to certain schools of the Sheffield School Board as having class-rooms arranged on a semi-circular apse round a central hall. Will you allow us to state that this idea was embodied in the designs which we submitted for the City of London School four years ago,—long before the Sheffield schools were designed,—and that our designs were not only publicly exhibited with the others, but that this "circular" arrangement was specially referred to in your journal at the time?

F. H. FOWLER.
THOS. W. ALDWINCKLE.

THE NEW LAW COURTS.

SIR,—Amongst the many notices of, and criticisms on, the New Law Courts, I have not seen any remarks on the remarkable shrinkage of the woodwork in the ceilings of all, or nearly all, the courts. As seen from the galleries, it has a very bad appearance. Could not some means be taken during the vacation to remedy it? H. S., Clapham.

Miscellanea.

"Silos" for "Ensilage."—The method of preserving crops which is known as "ensilage" has attracted considerable attention in this country during the last year or two, and the question is now raised as to the cost of the "silos" or pits in which the crops are kept. Mr. W. A. Gibbs, of Gilwell Park, Chelmsford, well known for his efforts to save crops in another way, writes to say that from America it is reported that Mr. Mills has had two silos constructed of 40 ft. long, 13 ft. wide, and 20 ft. deep. The walls are 2 ft. in thickness, and made of concrete and stone, faced with cement. The cost of these is said to have been about $700. These two pits held the produce of thirteen acres, which is stated as 600 tons. In order to ascertain what silos of these dimensions would cost us in England, Mr. Gibbs obtained an estimate for two exactly similar in size and mode of construction, and found they would cost him 700*l*., but the contractor explained that if gravel existed on the estate for the making of concrete they would probably be made for 400*l*. On the other hand, he pointed out that if in sinking 20 ft. or any less depth it caused an influx of water, this would largely increase the cost, and he declined to be bound by any definite estimate of cost that would cover that contingency. Professor J. E. Thorold Rogers writes,—"The Board of Trade and the Foreign Office do not seem as yet to have got much information on 'ensilage.' Mr. Loring's report states that the cost of silos, per ton of capacity, varies from $4 to $5 for walls of heavy masonry and superstructures of elaborate finish, and 50 cents. or less for the simplest wooden silos. Earth silos without wall can be excavated with plough and scraper, when other work is not pressing, at moderate cost. Either concrete building is far dearer in England than in the States, or Mr. Gibbs's contractor has asked him a very large price. I saw Mr. Mills's silos. They cost 700*l*. He told me that they cost too much, and that if he were building now, he could make them much more cheaply. I may add that American farmers buy cement, and build concrete themselves."

St. Paul's Church, Stratford.—A memorial pulpit was erected in the above church the week before Christmas. It is in memory of the late vicar. The style is Late Decorated. The main body of the pulpit is in Caen stone, but it is enriched by various coloured marbles in columns, pillars, &c. The carving is carried out in the natural form. It has been executed by Messrs. Jones & Willis.

The Sanitary Inspection of Houses.—In a lecture delivered before the Society of Arts, on Wednesday evening last, Mr. Burton, the chief inspecting engineer to the London Sanitary Protection Association, gave some account of the work of the association. He stated that, in the two years during which the association has been in existence, he and his assistants had inspected 523 houses. In twenty-nine of these they had found the drain entirely stopped up, no communication at all with the sewer, and all the foul matter sent down the sinks and soil-pipes being simply deposited under the basement of the house. In 166 houses they found the soil-pipes leaky, allowing sewer gas and, in many cases, liquid sewage to escape into the house. In 194 houses the overflow-pipes of the cisterns were led direct into the drains or soil-pipes, thus allowing sewer-gas to pass up them and contaminate the water in the cisterns, as well as pass freely into the houses. In 357 houses, or about three-fourths of those examined, the waste-pipes from sinks and baths were found to be connected directly with the drains, allowing the sewer-gas to pass up them, instead of being led outside the house, and made to discharge over trapped gullies in the open air, so that nothing could pass up them except air. *Apropos* to this, Mr. Alan S. Cole writes to point out that the subject is one in which his father, the late Sir Henry Cole, was interested, having, shortly before his death, drawn up a scheme for organising guilds of health in every parochial district throughout the United Kingdom. The guilds of health were suggested with a view of supplementing and increasing the efficiency of local boards. Their primary object was improvement in domestic sanitation. The only particulars of Sir Henry Cole's scheme which have been printed appeared in the *Builder* about a year ago (vol. xlii., p. 175).

Society of Painter-Etchers.—The exhibition of this Society for 1883 will be held in London, and will open on the 1st of March, for (about) six weeks. All forms of engraving on metal, whether by the burin, the etching needle, by mezzotint or aquatint, or by whatever other process the artist may choose as a means of original expression, are understood to be included in the term "painter-etching," and, subject to the approval of the Council, are eligible for exhibition, whether the artist sending them be a Fellow of the Society or not. Works sent for exhibition, besides being original, must be the *bonâ fide* property of the artist, and directly contributed by him, or by his written authority. No works being the private property of a collector, or forming part of any printseller's stock, or which have been previously exhibited or offered for sale elsewhere, can, under any circumstances, be admitted. All works intended for exhibition must be forwarded (suitably framed) on or before the 21st of February, 1883, to Messrs. Hogarth & Sons, 96, Mount-street, Grosvenor-square, W. The works submitted for exhibition must be accompanied by a letter to the honorary secretary, Sir William R. Drake, F.S.A. (under cover to Messrs. Hogarth), written on one side only of the paper, containing the title of the work, its price if for sale (inclusive and exclusive of the frame), and the name and address of the contributor; and a duplicate copy of these particulars must also be securely pasted on the back of each frame.

The Consumption of Coal in London.—It is stated that notwithstanding the increase which took place in the population of the metropolis last year, and the large areas that were covered with buildings, in which fuel for gas and other purposes would be required, nearly 2,000,000 tons less coal was entered within the area of the City duty in 1882 than was the case in 1881. This diminution of consumption is attributed to increased economy and to the effect of the many fuel-saving and heat-economising appliances introduced a few years since when coal was abnormally high and somewhat scarce. No doubt these causes had some share in reducing the consumption, but probably the main cause of the reduction was the mildness of temperature which prevailed for the greater part of last winter.

In re "Messrs. Bull & Sons' Liquidation." The London and South-Western Railway Company have instructed Messrs. Perry & Co., of Tredegar Works, Bow, to complete all works which Messrs. Bull & Sons had in hand for the Company, and Messrs. Perry & Co. have made arrangements to continue the works, so that there will be no delay in the progress thereof.

Two Terrible Disasters.—Fire has played sad havoc with property during the last few weeks, but two of the latest disasters caused by fire have involved the burning to death of a very large number of persons. From the other side of the Atlantic we learn that New Hall House, Milwaukee, the largest hotel in the State of Wisconsin, which had rooms for 800 guests, was, on the 10th inst., totally consumed by fire, and almost without warning, so sudden was the outbreak. From the windows of the hotel dozens of the inmates leaped together, and from the bedrooms individuals sometimes jumped, sometimes shrank back into the flames. Stone-street was speedily covered with bodies of the dead and dying. The loss of life is chiefly among the eighty-seven servants, who slept in the sixth story, from which the fire immediately cut off access to the lower stories. Of sixty maid-servants, forty-nine are reported missing. The number of fatal casualties is estimated at 100. It is stated that in the corner of every stair-landing stood a fire-escape, and there were several more outside; but everybody was so bewildered with fright that no one could bring the escapes into use. "Traveller" writes that in many American hotels there is an effectual means of escape provided in case of similar disasters. "On every landing there is a notice fixed up which points out to the visitor the direction of the fire-escape. This escape consists of a staircase built absolutely outside the exterior wall of the hotel, and to this staircase there is access from each landing. These escapes are generally covered by a zinc roofing, and are used by the servants of the hotels." This is a matter demanding due attention at the hands of those who are responsible for the safety of the inmates of the large hotels which are now becoming so numerous in this country. ——From Bernarditscheff, in Russian Poland, comes the terrible news of the burning of a circus, involving the loss of at least 150 lives. It is stated that through the careless handling of some fireworks on the stage the curtain caught fire, and the flames spread in a few minutes to the wall and the roof. The members of the orchestra were the first victims. The audience, 800 in number, rushed frantically to the door of exit, which, however, opened inwards, and as the crowd pressed forward it was rendered perfectly useless. A rush was then made to the side doors, both of which proved, unfortunately, to be nailed up. The circus is described as a wooden building, which, from its construction and its material, offered every advantage to the flames. To add to the danger, the partitions were filled with straw, so that it would be difficult to find a more inflammable building.

Memorials at Woolwich.—The Woolwich Memorial to the late Prince Imperial of France was unveiled on Saturday last by H.R.H. the Prince of Wales. The statue is by H.S.H. Count Gleichen, the granite in the pedestal coming from Mr. D. D. Fenning's quarries at Mull. The granite for the Military Memorial, unveiled at the same time, came from Mr. Fenning's quarries at Shap, the granite in both cases being wrought at Mr. Fenning's works at Shap.

TENDERS

For alterations to the Mackworth Arms, Commercial-road East, for Mr. Thomas Hill, exclusive of pewtering and gas-fitting. Messrs. Wilson, Son, & Aldwinckle, architects, 2, East India-avenue. Quantities supplied:—

Hall, Beddall, & Co.	£2,455 0 0
Spencer	2,430 0 0
Hearle & Son	2,250 0 0
J. & H. Mills	2,114 0 0
Cox	2,076 0 0
Beale	2,023 0 0
Shurmur (accepted)	2,016 0 0

For additions to the City of London Brewery, Upper Thames-street, for the directors of the City of London Brewery Company (Limited). Messrs. Scamell & Colyer, architects, 18, Great George-street, Westminster. Quantities supplied by Messrs. R. L. Curtis & Sons:—

Contract No. 1.—*Building.*

		Old Materials.
G. & S. Williams	£10,480	£100
T. Rider & Sons	9,938	50
Langmead & Way	9,875	75
W. Brass	9,853	50
Mowlem & Co.	9,645	100
H. Lovatt	9,600	75
J. Morter	9,333	100
J. Brown	9,120	150
B. E. Nightingale	9,061	80
T.W. Smith & Son (accepted)	8,770	140

Contract No. 2.—*Ironwork.*

Handyside & Co. (Limited	£4,239 15 9
Young & Co.	4,053 0 0
Moreland & Son	3,890 12 0
Dawson & Nunneley	3,608 6 9
Thornewill & Warham (accepted)	3,462 0 0

For alterations, improvements, and repairs to the Albion Mews, Hastings, for Mr. Edwin Plummer. Mr. Arthur Wells, architect, Hastings, & 70, Chancery-lane :—

Rodda	£1,360	0	0
Brown	1,290	0	0
Vidler	1,226	0	0
Howell & Son	1,200	0	0
Cruttenden	1,148	0	0
King	1,100	0	0

For alterations in, and paving of a portion of, the Cattle Market, Norwich, for the Norwich Corporation. Mr. W. W. Lake, City Surveyor :—

Read	£2,675	0	0
Batch	2,499	0	0
Hammond	2,480	0	0
Youngs & Son	2,163	0	0
Downing & Son (accepted)	2,000	0	0

For the erection of two blocks of dwelling-houses on the Bridge House Estate, Brockley, London. Mr. W. Charles Evans, architect, 3a, Poet's Corner, Westminster Abbey:—Mr. T. Gregory, Clapham Junction (accepted) £3,288

For Dr. Stafford's house, Rose Villa, Windlesham, Surrey. Messrs. Byrne & Wilmot, architects, 303, Strand, and Windsor :—

Norris	£2,751	0	0
Woodbridge	2,380	0	0
Pither	2,299	0	0
A. L. Oades & Sons	2,295	0	0
R. Squelch	2,220	0	0
Charman	2,182	0	0
Hann & Co.	2,160	0	0
Watson	2,130	0	0
W. Reavell	2,100	0	0
J. Higgs (accepted)	1,977	0	0
Kingerlee	1,969	0	0
Halley	1,954	0	0

For rebuilding No. 6, Albion-terrace, Page Green, Tottenham, for the directors of the Capital and Counties Building Society. Mr. H. A. Rawlins, architect :—
McCormick & Sons (accepted).

For new billiard-rooms, and other additions to the Albany Club, Holloway. Mr. H. A. Rawlins, architect :—
Steed Bros. (accepted).

For works to No. 28, Hoxton-square, Shoreditch, for Mr. G. W. More :—

J. Webb	£399	0	0
J. Ivory	365	0	0
G. Bulford (accepted)	356	0	0
S. Bartram	320	0	0

Accepted for the erection of a new ale tun-room, works to river wall, boiler house, chimney shaft, ice machinery room, and other works, for The City of London Brewery Company (Limited), Upper Thames-st. Messrs. Scamell & Colyer, architects and engineers, 18, Great George-street, Westminster. Quantities by Messrs. R. L. Curtis & Sons:—

Contract No. 1.—*Building.*			
T. W. Smith & Sons, London	£8,770	0	0
Contract No. 2.—*Ironwork.*			
Thornewill & Warham, Burton	£3,462	0	0
Contract No. 3.—*Boilers.*			
Thornewill & Warham, Burton	£860	0	0
Contract No. 4.—*Millwright's Work.*			
Thornewill & Warham, Burton	£2,090	0	0
Contract No. 5.—*Cooling Machinery.*			
Siebe, Gorman, & Co., London	£1,420	0	0
Contract No. 6.—*Backmaker's Work.*			
Ramsden, London	£1,341	0	0
Contract No. 7.—*Slate Mason's Work.*			
Ashton & Green, London	£625	0	0
Contract No. 8.—*Pipe Connexions.*			
Bindley & Briggs, Burton	£3,795	0	0

For building episcopal residence in Edinburgh-road, Portsmouth, for the Right. Rev. Bishop Virtue, D.D. Joseph Stanislaus Hansom, architect, 27, Alfred-place, West, South Kensington. Quantities by Mr. Henry Smith :—

Claridge, Banbury	£8,230	0	0
Ward, Portsmouth	8,222	0	0
Tyerman, London	7,900	0	0
Light, Portsmouth	7,660	0	0
Hayter, Portsmouth	7,590	0	0
Crook, Southampton	7,187	0	0

Accepted for new high altar, reredos, and pulpit, for the Servite Church, adjoining St. Mary's Priory, 264, Fulham-rd. Mr. Joseph Stanislaus Hansom, architect :—

G. Porter, Chelsea	£855	10	0
Statues.			
R. L. Boulton, Cheltenham	75	10	0

For decorative repairs, and alterations to Belgrave House, Richmond, for Mr. W. Colman. Mr. Richard Peters, architect, Wool Exchange, Coleman-street :—

T. Ennor Julian	£110	0	0
L. H. Chitty	88	2	0
T. Watson (accepted)	67	15	0

For additions to South-street Boys' School, Coventry. Mr. Herbert W. Chattaway, architect, Trinity Churchyard, Coventry :—

G. Storer	£275	0	0
J. Wilson	265	0	0
J. Woof	237	13	3
Blakeman & Turner	226	0	0
A. Waters	214	15	0
A. Lester (accepted)	197	10	0

For fibrous plaster decorations of artists' work at the Grand Theatre, Islington, for Mr. Charles Head. Mr. Frank Matcham, architect, Rugby Chambers, Bedford-row :—

J. M. Boekbinder (accepted) £1,414 15 0

TO CORRESPONDENTS.

R. E. M. (first part of paper appeared in last week's issue).—W. W. (send specimen).—R. R. R. (glad to hear from you).—H. A. (3 ft.).—S. H.—B. & T.—H. A. R.—J. R.—S. & C.—J. S. H.—P. F. R.—D. D. F.—A. S.—P. & Co.—W. G.—R. B. & Son.—W. P. B.—T. W. A.—W. H.—A. W.—W. P. G.—C. & Son.—S. P. C.—F. R. W.—W. P.—J. C.—C. G.—B. & Co.—H. W. C.—H. & B.—M. O. T.—H. & W.—R. W.—J. W. C.—A. B.—R. W.—M. O. T.—E. G.—J. G.—G. B.—F. E.—C. Y.

Correspondents should address the Editor, and *not* the Publisher, except in cases of business.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

NOTICE TO SUBSCRIBERS.

THE INDEX and TITLE-PAGE for Volume XLIII. (July to December, 1882) were given as a Supplement with the Number of Jan. 13.

A COLOURED TITLE-PAGE may be had, gratis, on personal application at the Office.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

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DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

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